

No. 175. Vol. XXXVII. Part I.

JANUARY, 1952.

# GEOGRAPHY

FORMERLY THE GEOGRAPHICAL TEACHER.



THE QUARTERLY JOURNAL OF THE

## GEOGRAPHICAL ASSOCIATION

Central Office :  
c/o The Park Branch Library,  
Duke Street, Sheffield, 2.  
(Telephone : 25946.)

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LONDON :

PUBLISHED FOR THE GEOGRAPHICAL ASSOCIATION BY THE LONDON GEOGRAPHICAL INSTITUTE  
MESSRS. G. PHILIP AND SON, LTD., 32, FLEET STREET, E.C.4, AND PRINTED BY  
PERCY BROTHERS, LTD., THE HOTSPUR PRESS, MANCHESTER ; AND AT LONDON

PUBLISHED FOUR TIMES A YEAR. PRICE TO NON-MEMBERS, 3/6 NET

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# A GEOGRAPHICAL FIELD COURSE AT DALE FORT, PEMBROKESHIRE

P. W. BRYAN\*

IN July, 1950, I took a party of 22 students and three members of staff to Dale Fort, Pembrokeshire, for a fortnight's field course. Before going to Dale we had the impression that while admirable for biologists, the centre might not be so good for geographers. Preliminary map study and reading and a fortnight at Dale, convinced us that it is an excellent centre for geographical field work. We found it possible in that time to touch on the main geographical facts about Pembrokeshire and to do a fair amount of map survey work.

Professor Wooldridge in his Presidential Address to Section E of the British Association at Birmingham, spoke of the need to keep both feet firmly on the ground. With that I find myself in entire agreement especially when he says for ground you may read "land" or "landscape" always provided we mean by "landscape" not merely the cultural landscape but also the physical landscape on which it is based. Geographically the study of the cultural landscape, or if you prefer it, the additions to or changes in the physical landscape which man has made, are to me meaningless without a very considerable knowledge of the physical landscape itself. How can it be otherwise when at the core of our subject lies the relationship between the two; where man is involved the greater part of the landscapes we study are largely the result of man's action in changing the surface of what nature made, his action being limited by nature's resistance to that change.

This view is fundamental to our teaching and to our geographical field courses at Leicester. Our field courses run for a fortnight instead of a week. We try to select for study a piece of country in which a student group can get within that period some real grasp of the landscape of a region as a geographical whole. Pembrokeshire seemed to us to be such an area, and we felt that as a result of a fortnight's intensive work our group came back with some balanced appreciation of the landscape in both its physical aspect which is fundamental, and its cultural aspect which is more obvious.

The work of the course fell under two main heads:

1. Practical surveys involving mapping on the ground. These included a land use survey of the Dale and Wooltack Peninsulas; a plane table survey of the Gann estuary which has radically changed since the Ordnance Survey map was published; and some levelling to establish a datum point for ecological work being done at Dale Fort. These surveys occupied about one-quarter of the total time.

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\* Dr. P. W. Bryan is Head of the Department of Geography and Vice-Principal of University College, Leicester. His article is based upon an illustrated lecture given at the Annual Conference, 1951.

2. The rest of the time was given to what I may perhaps call observational trips to selected areas both by coach and on foot to observe at first hand the features of the landscape; to compare them with the 1-inch and 1/25,000 Ordnance Survey maps; and to discuss their origins. All these trips involved talks and discussions on the ground.

Each student was supplied with a copy of the  $\frac{1}{4}$ -inch, the 1-inch, and where needed the 1/25,000 Ordnance Survey maps. The land use survey was done on the 6-inch and the Gann survey on the 1/2,500. In addition to helping generally each member of the staff specialised on a particular aspect of the work—Mr. Jennings on the physical, Mr. Millward on the early historical, and Mr. Smith on the modern economic. My own function was that of photographer and general supervisor to maintain a sense of the geographical wholeness of the area. Four main talks were given in the evenings, and each morning the students were briefed on the work of the day.

I should like to take this opportunity of expressing our indebtedness to the staff at Dale Fort for their invaluable help.

Pembrokeshire is a peninsula running south-west towards the Atlantic from the main mountain mass of Wales. Within this main peninsula are three lesser ones—the Dale-Wooltack Peninsula in the centre, the Castlemartin peninsula in the south, and the Dewisland peninsula (St. David's) to the north-west. Each of these is broken up into lesser peninsulas, so that the sea interpenetrates the county at numerous points. The sea influences are accentuated by Milford Haven, the tidal waters of which run far inland up its creeks and rivers, such as the Cleddau and Carew, into the heart of the county. Maritime influences and access from the sea are increased by the many small coves, havens and fishing ports made by the action of the sea in eroding rocks of varying degrees of resistance which form the cliff coasts. No part of Pembrokeshire is more than eight miles from tidewater and the whole of the centre and south lies within four miles of tidewater. As a result our minds tended to be dominated by the sea and by the influence of the sea both in the past and in the present.

The physical landscape of most of Pembrokeshire (Fig. 1), as Professor Miller, Dr. Trueman and others have pointed out, consists of a series of marine erosion platforms, dropping in elevation from 400–450 to 150 feet, produced as a result of wave action during the recession of the sea in late Tertiary times. An exception is the Prescelly Mountain area in the north-east which rests on a 600-ft. platform of what Professor Miller believes to be a plateau of sub-aerial erosion, though even it may, in earlier times, have been a marine erosion surface. These surfaces have been dissected by later river action, and except where this has occurred, the underlying rock material bears little relationship to the shape of the present surface. Above the erosion surfaces rise hills and ridges of more resistant intrusive and extrusive igneous material.

The cliffed coastlines of Pembroke are a nearly unbroken series of geological sections of almost textbook clarity, in rocks of varying



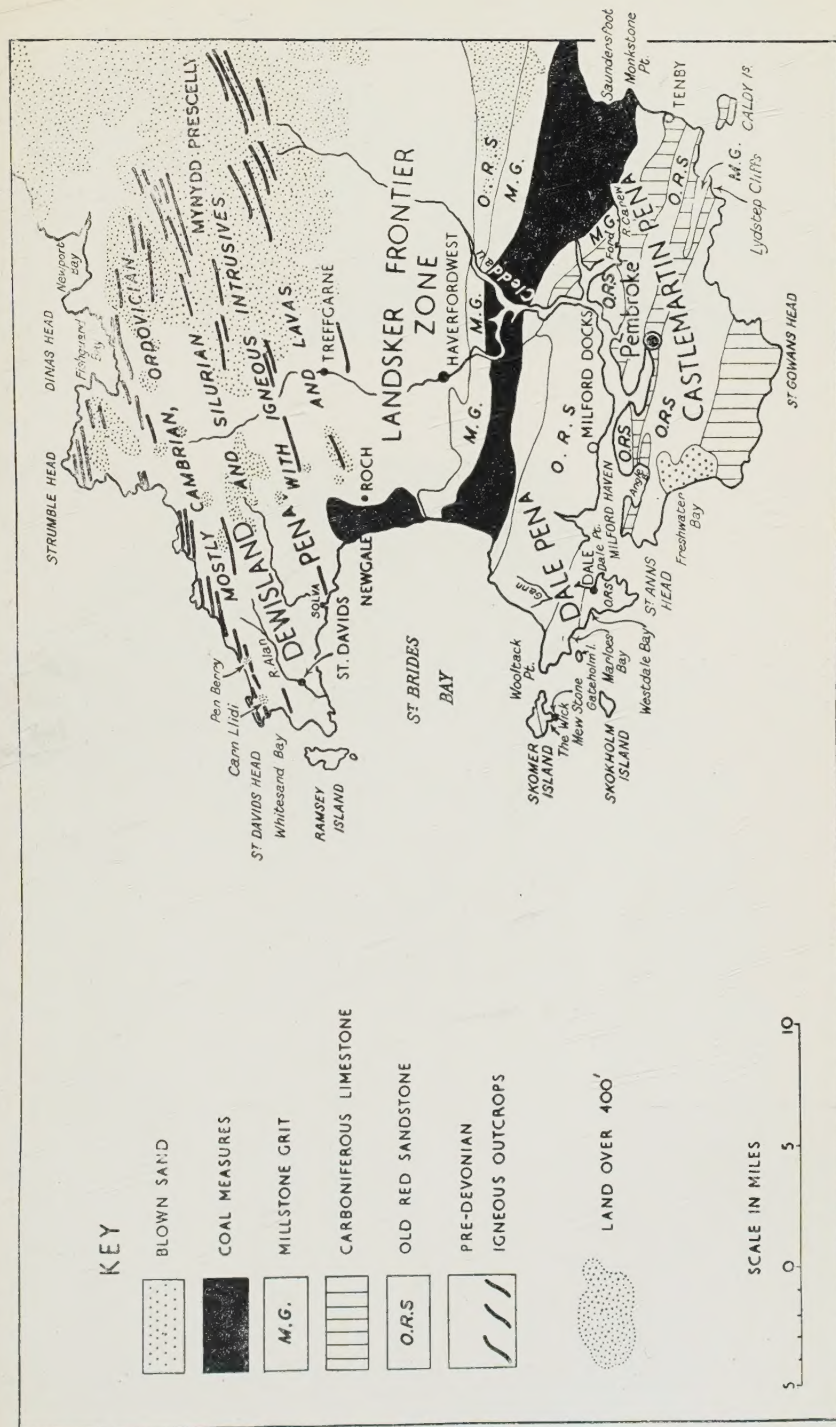


Fig. 1.—Sketch map of Pembrokeshire.

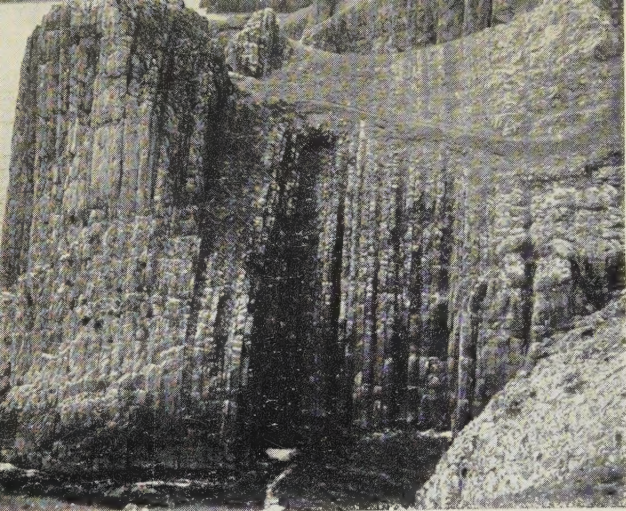


Fig. 2.—Limestone cliffs, Lydstep, looking west. Bedding planes parallel to coast and nearly vertical.

Fig. 3.—Asymmetrical anticline, Ladies' cave, Saundersfoot. Bedding planes in Coal Measures, perpendicular to shore-line.

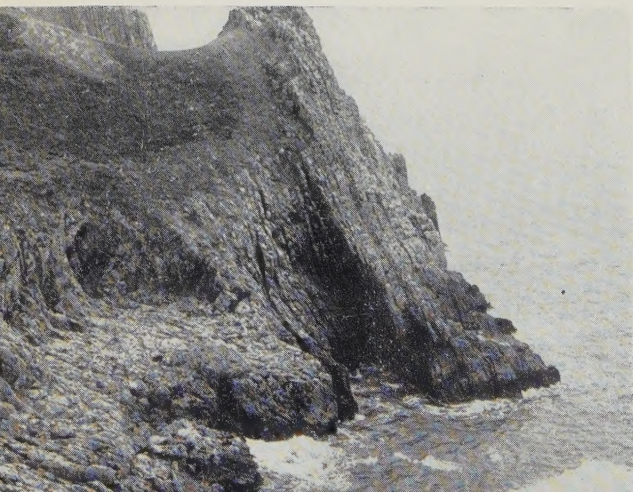


Fig. 4.—Raised beach platform cut in limestone, Lydstep.



degrees of resistance, attacked by the sea—the main eroding agent—at almost every angle, depending on the orientation of the coastline in relation to the strike of the rock outcrops. It is seldom in the field one finds such a series of readily accessible sections to illustrate the structure of the underlying material.

In the south of Pembrokeshire the underlying rocks are the Coal Measures with some small outcrops of Silurian, the Millstone Grits, the Carboniferous Limestones, and the Old Red Sandstones. All these rocks were folded in the Armorican earth movements. North of a line running east and west through Haverfordwest the rocks are older than the Old Red Sandstones and are mainly of Cambrian, Ordovician and Silurian age together with much material of igneous origin both extrusive and intrusive. The igneous intrusives form lines of rugged hills like Carn Llidi and Pen Berry in Dewisland and are possibly remnants of the old 600-ft. surface and stood out as islands when it was being dissected. The general trend of the folding in the north is that of the Caledonian system. The numerous bands of igneous material especially in the north-east, like the steel frame of a modern building, probably gave greater strength to this area to resist erosion. This is only a broad generalisation of an area which in detail is highly complex.

The peninsular character of the county allows the warm western maritime type of climate to carry mild humid conditions inland. Frost and snow are very rare on the coasts, although gales are frequent. Records of daily maxima and minima kept at St. Anne's Head show that only on two or three occasions in the winter do night temperatures drop below freezing point. Even in winter there are mild sunny days and warm nights. Cattle need not be winter-housed and poultry roost out of doors. Spring comes at least a week earlier than in eastern England. In the south and west there is a coastal belt which gets less than 35 inches of rain. This increases steadily inland and is over 60 inches on the Prescellys. These conditions are very favourable for the growth of grass, oats, and roots and for the production on the coast of early potatoes and market garden produce generally.

This physical landscape or background has had superimposed on it by man the historical landscape and the modern economic landscape both of which are parts of the cultural landscape. The historical landscape is rich in the pre-history of megalithic times, rich in the raths and forts of the iron age people, rich in the coastal names of the Viking raiders, rich in the evidences of early Christianity, rich in Norman castles and churches and in the contrast between the Welsh north and the English south. The modern economic landscape exhibits striking contrasts, among other things, between the sheep country of the north-east, the dairying and mixed farming country of the centre, the specialised market gardening of the south-west, and the fishing and shipping of the coast and Milford Haven.

In what follows an attempt is made to summarise briefly on a regional basis some of the more striking features which the members of



the field group saw and studied. This was originally shown in the form of a film in colour.

The Dale Peninsula projects south-west from central Pembroke. At its western end a minor peninsula projecting south terminates in St. Anne's Head and forms the northern side of the entrance into Milford Haven. This minor peninsula is separated from the main peninsula by the depression in which lies the village of Dale. Dale Fort is situated on a headland running south-east at the north-east corner of the minor peninsula. Between Dale Fort and the main peninsula lies Dale Haven. The main rock formations here are the Old Red Sandstones with some superficial deposits of boulder clay. These rock formations outcrop along lines from west-north-west to east-south-east so that the bedding planes are found parallel to and at various angles to the run of the coasts. The studies of the group were first concentrated on this minor peninsula the surface of which is a typical uplifted marine erosion platform. The coast is everywhere a cliff coast. At the extreme end of the point on which Dale Fort is located the bedding planes are at right angles to the coast and are clearly exposed dipping at an angle of 60 degrees to the south-west. On the south-west side of this point the bedding planes are parallel to the coast, dipping at 60 degrees, and wave pressure, which in a gale may reach three tons per square foot, has eroded a series of natural arches along lines of weakness in the bedding planes. At the south-west corner of St. Anne's Head the bedding planes are running west-north-west and at a point called the Cobbler's Hole a wave-eroded ravine or geo (from the Icelandic for "chasm") has cut across the bedding planes and exposed a striking syncline and faulted anticline. At the north-west corner of this minor peninsula, the harder members of the bedding planes form long narrow steep-sided peninsulas running out to sea and on the summit of one of these is an Iron Age fort or rath protected on the landward side by a double bank and ditch. Immediately north of this rath the sea, working along weaker members of the bedding planes, has eroded a typical cove or bay—Westdale Bay—thus beheading the Dale stream in the depression already referred to. In this depression are the ruins of a Norman castle hidden from view of possible sea raiders to the west by the rise in the depression and to the east by a belt of timber.

With the exceptions of an area near the rath in the north-west occupied by H.M.S. *Harrier*—a naval training station, an area in the extreme south occupied by the coastguard and meteorological station at St. Anne's Head, and certain patches of poor soil devoted to cattle and sheep, the marine erosion surface south of the depression is almost entirely arable on the deep, rich, friable soil weathered from the Old Red Sandstone. Stone and sod walls, thickly overgrown in the warm, moist climate, take the place of the hedges of the interior, and in the salt spray zone on the south-west of St. Anne's Head the sea pinks illustrate the survival of the fittest in an inimical environment.

To the north-east of Dale village the river Gann is a typical example of the dissection of the plateau surface by stream action. The river



terraces above its estuary and the adjacent plateau surface form the site of Crabhall market garden farm (about 300 acres) which concentrates on early potatoes (80 acres) followed by machine-planted brassicas. It grows oats, barley, and tomatoes, keeps some cows for manure, imports fish manure by sea from Hull, is heavily mechanised, employs about 38 hands, and is an excellent example of the utilisation of this warm, moist coastal site.

In the estuary of the Gann wave and stream action combined to produce the marshes and shingle spit shown on the 1/2,500 Ordnance Map. Excavation of the back of the shingle spit by man and a series of gales during the war breached the spit, converted the marshes into lagoons, and led among other things to interesting changes in the vegetation. Part of the student groups spent three days in the intervals of gales remapping the estuary, and apart from the value of the exercise they produced a map of use to the Field Centre.

On the west coast north of the depression the most striking feature is Marloes Bay eaten out in a zone of Silurian and Ordovician rock material, the harder members projecting seaward as reefs and stacks. There is no appreciable change in the level of the marine erosion surface at the top of the cliffs where the Old Red Sandstone at the south end of the bay gives way to the Silurian and Ordovician series.

Farther to the north-west off Wooltack Point lies Skomer (a Norse name) Island, roughly rectangular in shape, consisting for the most part of Ordovician lavas with intervening beds of quartzites, dipping east of south. Where the quartzites are faulted to the east and south, three striking coves—North Haven, South Haven and the Wick (Norse)—have been eaten out along the crushed and less resistant zones of the bedding planes. The marine erosion surface of the island forms a striking contrast to the cliff coast; the latter is the home of innumerable seabirds of which the puffins (some 60,000) are the most numerous. From the mainland a striking feature is the Mew Stone—a mass of lava at the south end of the island separated from it by the Mew Stone Gut eroded along a quartzite zone.

From Dale Point one can look south-east, across the two miles of water which forms the entrance to Milford Haven, to Angle Bay at the north-west corner of the Castlemartin Peninsula in the end of a partly eroded syncline in Carboniferous and Silurian rocks. Structurally the Castlemartin Peninsula consists of a series of synclines and anticlines in the Armorican folds—the rocks being roughly from south to north the Carboniferous Limestone, the Old Red Sandstone, the Millstone Grits, and the Coal Measures, with lesser zones of Silurian, the whole planed off by marine erosion, and subsequently dissected by streams following the general west-north-west—east-south-east direction of the old folds. Here as in the Dale area the bedding planes are sometimes parallel to and sometimes at a sharp angle to the run of the coast. Hence the character of the coast varies markedly from one area to another. On the west coast at Freshwater Bay, eaten out at the end of a zone of weakness in the Silurian, the sea winds have piled up a series of



striking sand-dunes and at the south end of the bay a hard rock layer stands up as the remnant of a raised beach. By contrast in the south-east corner between Skrinkle Haven and Lydstep the bedding planes of the limestone are parallel to the coast dipping at an angle of 90 degrees, and the constant fretting action of the sea plus solution of the limestone has formed a striking series of caves, collapsed caves, and natural arches. Farther north between Saundersfoot and Tenby the bedding planes of the lower coal measures are at right angles to the coast and exposed in the cliffs is the complicated folded structure underlying the marine erosion surface of the Castlemartin Peninsula consisting of synclines; asymmetrical anticlines, e.g. the Ladies' Cave; a small anticlinorium in the coarse sandstones at the base of the Coal Measures at the end of Monkstone Point; and numerous faults. These coarse sandstones are very resistant and form stacks and reefs running out beyond the point.

Milford Haven, lying between the two peninsulas with tidal arms extending north and west deep into the heart of Pembrokeshire, carries Atlantic influences far inland and played in the past and still plays a large part in the life of the county. When a gale is approaching from the Atlantic, the storm cone flies on St. Anne's Head, the sea begins to rise and run in on the coast, the trawlers and fishing smacks run in for shelter, thus demonstrating one of the chief functions of Milford Haven all through the centuries. At other times trawlers run in to unload fish at Milford Docks or to wait at anchor in the Haven for rising prices wirelessly by agents ashore. The fishing industry of to-day makes the Docks the third largest fishing centre of the west coast.

The extreme south-east arm of Milford Haven is the part-tidal Carew River. At head of tide the Celtic missionaries erected a famous cross. Later the Normans conquering westward along the lowlands of South Wales built a castle by the ford near the cross. Pressing on westward they built on a rocky limestone peninsula on the south side of Milford Haven the great castle of Pembroke destined to become the headquarters and the strongest point of Norman power in Little England beyond Wales. Spreading northward they built another castle at Haverfordwest at head of tide on the Cleddau, a northern arm of Milford Haven in the centre of inland Pembrokeshire.

The heavier rainfall and mild equable climate of central Pembrokeshire makes it a grass country admirably suited to dairying and mixed farming. The student group spent some time going over a typical farm—Cottesmore Farm—some two miles north of Haverfordwest. This farm is primarily a grass and hay farm, the hay in the moist climate being dried on tripods and stacked for the winter feed of the dairy cattle. No artificial fertilisers are used. The farm is all organic: compost heaps made of manure, sludge, straw, hedge clippings and lime are a characteristic feature of the farm which is also highly mechanised. It produces about 100 gallons of milk per day.

Immediately north of this farm a zone of large parishes beginning at Newgale on the west coast with the parish of Roch sweeps east



Fig. 5.—Marine erosion surface planed across Skomer island and Dale peninsula. Looking south-east from Skomer across Gateholm island to Dale with H.M.S. *Harrier* on skyline to left.



Fig. 6.—Glacial overflow channel cutting completely across Dinas Head, looking north-east to the inflow from Newport Bay.

Fig. 7.—Iron-age rath with double bank and ditch on promontory south of Westdale bay—H.M.S. *Harrier* on skyline (cf. Fig. 5).





Fig. 8.—Cromlech Arthur, St. David's Head, looking south-east over Whitesand bay and marine erosion surface of Dewisland with island-like residuals. Sub-maritime heath with sea-pinks in foreground.

Fig. 9.—Celtic cross at Carew Ford.



Fig. 10. — Pembroke Castle sited on a limestone peninsula washed by Milford Haven.



across Pembrokeshire through the parishes of Camrose, Rudbaxton, Wiston, etc., and was the no-man's-land of border warfare in Norman times. It is the Landsker. Through broken topography the country slopes up to the 600-ft. platform on which stand the Prescellys. The Landsker is marked by a line of Norman border castles. It separates the Welsh-speaking north from the English-speaking south. At Treffgarne the Cleddau cuts through an igneous zone in a deep gorge which was part of the glacial overflow system north of the Prescellys. Nearby the gorge the igneous material is quarried and crushed for road metal. The 600-ft. platform has numerous small Welsh farms with cattle and sheep. Above 1,000 ft. are the open grass moors which sweep up over the summits of the Prescellys to 1,760 ft. The country here is better for sheep than either central Wales or Scotland. It is open grass heath, spring comes earlier and the winters are less severe. The party visited Dolau Bach, a small sheep farm of about 600 acres located just below the 1,000-ft. contour but running high up on the grass moors.

On the lower north-eastern slopes of the Prescellys there are megalithic chambered tombs, here called dolmens, of which Pentre Evan is a good example located high above the dwellers in the low grounds and within sight of the sea from which the megalithic cult came, but safe from sea marauders.

At the foot of the northern slopes there is a series of clearly marked glacial overflow channels cut out by the drainage of the lakes formed between the ice face moving in from the Irish Sea and the slopes of the Prescellys. One of the most striking of these is the comparatively short Dinas overflow channel south of Dinas Head between Newport Bay and Fishguard Bay.

West of the Prescellys lies the Dewisland or St. David's Peninsula composed of Cambrian and Ordovician sedimentaries, volcanic ash, and igneous bands (dolerite). In general the surface is the late-Tertiary marine erosion platform at an elevation of about 200 ft. On the south coast the estuary of the River Solva (a normal erosion stream on the plateau) is an excellent example of a drowned valley. Farther west the River Alan trenching below the surface of the plateau provided a site hidden from the sea on which the Cathedral of St. David's, the great centre of Welsh Christianity and culture was built. Small ports eaten out in the softer sedimentaries to north, west and south of the peninsula were available for landing no matter what the wind direction, and made approach to the Cathedral easy, at a time when missionary movement was mainly by sea. Running east from St. David's Head a resistant band of dolerite stands up in the striking ridge of which Carn Llidi (595 ft.) and Pen Berry (573 ft.) are the chief summits. On the south side of St. David's Head Porth Lleuog and Porth Melgan are typical coves eaten out by the sea in the softer sedimentaries between resistant dolerite bands. St. David's Head is rich in pre-history including hut circles, forts and a chambered tomb—Cromlech Arthur.

After our visit to Pembrokeshire there remained in our minds a strong feeling of the influence of the sea. The sea which to-day thunders

against the coasts and spreads far inland along tidal channels, carved in recession in Tertiary times the erosion platforms which form much of the surface of Pembrokeshire and the basis of its cultural landscape. The sea, attacking the edges of these platforms, etched out in rocks of varying degrees of resistance the capes and headlands, bays and coves, stacks and reefs, caves and natural arches which make up the savage, wild, and beautiful coasts and show to us something of the nature and structure of the flat inland surfaces of the county. The sea brought the megalithic culture with its chambered tombs and standing stones, the iron-age people to fortify raths on sea-girt promontaries, Celtic missionaries to erect crosses and shrines and to enrich Welsh culture, Vikings to name bays and islands, and the Normans to build castles and square-towered churches and create the Landsker in their struggles with the Welsh—a struggle which gave us Little England beyond Wales. The sea gave Pembroke the fishing of the little coves and the larger industry of Milford and the trawlers and the French and Spanish ketches and the smugglers of the past and perhaps of the present. The prevailing winds from the sea carry far inland mild moist equable conditions promoting the growth of grass and early crops and affecting the characteristic farming practices—the hay lifts being an adaptation of a sailor's rigging. The very fertiliser for the market gardens comes from the sea by the sea. The sea is woven into the warp and woof of the Pembrokeshire landscape both physical and cultural; it has set its impress both on its past and present; and for these reasons the key to much of its geography is the sea.

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# LOCAL GOVERNMENT AREAS IN WALES

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J. G. THOMAS\*

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IN March 1948 the Local Government Boundary Commission published its Report for the year 1947, a report which made detailed recommendations for the reorganisation of the Local Government Areas of England and Wales.<sup>1</sup> Though the terms of reference of the Commissioners prevented them from effecting the reorganisation, it was clear from the report that should their powers be widened, the necessary decisions had already been made. The report and its implications were analysed in some detail by Mr. E. W. Gilbert at a meeting of the Royal Geographical Society in May 1948<sup>2</sup>, and it is the object of this paper to consider, in more detail, the suggestions of the Commission concerning Local Government Areas in Wales, suggestions which in Mr. Gilbert's words "are of great interest to any student of the geography of Wales." Before doing so however, it is advisable to give a brief resumé of the present areas and systems of local government as they affect Wales, and to consider, from a geographical standpoint, whether changes are indeed necessary.

There are at present two types of authorities which are responsible for the provision and administration of those services normally associated with local government. In the first place there is the County Borough, or "one-tier" authority which is wholly responsible for local government within its own area. Wales (i.e. the 12 counties) has three such units, all located in the South Wales industrial area, namely Cardiff, Swansea, and Merthyr Tydfil, with populations (in 1951) of 243,627, 160,832 and 61,093 respectively. Secondly, there is the County or "two-tier" authority, with its subdivisions into Municipal Boroughs, Urban and Rural Districts. Here some functions of local government are performed independently by the smaller units while others are executed for the whole county by the County Authority, i.e. the County Council. If Glamorgan be excluded for the moment, such units in Wales vary in size from Merioneth, with a population of 41,456 to Denbighshire and Carmarthenshire with populations of 170,699 and 171,742 respectively, though county areas with populations of less than 100,000 are the rule rather than the exception.

The type of local government is however, of more interest to the administrator than to the geographer, and the latter's concern is mainly with the areas and boundaries of the counties. Accordingly little

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<sup>1</sup> *Report of the Local Government Boundary Commission for the year 1947* H.M.S.O. 1948.

<sup>2</sup> E. W. Gilbert. The Boundaries of Local Government Areas. *Geogr. Journal*. Vol. xxi, 1948, pp. 172-206.

attention will be paid here to the areas or economic structure of the County Boroughs. The County Councils, each controlling its own county area came into being with the Local Government Act of 1888, and were often based on so-called "geographical counties," an anachronistic term referring to ancient units, some of which had individual histories and had developed some form of local consciousness. In Wales, five such units had been created by the Statute of Rhuddlan in 1284, and these correspond, more or less, to the present areas of Anglesey, Caernarvonshire, Merioneth, Cardiganshire and Carmarthen-shire. These were governed by the Prince of Wales, while in addition there were the three strategically placed Counties Palatine of Pembroke, Glamorgan, and Flint. The remainder of the Principality formed part of the Marcher Lordships, and these were not split until the Act of Union in 1536, when, after additions had been made to some of the existing counties, the remaining area was subdivided to form the counties of Denbigh, Montgomery, Brecon, Radnor and Monmouth. The internal political divisions of Wales are very largely a heritage from the 16th century, and it is necessary therefore to consider how far the subsequent changes in political, economic and social conditions prevent these divisions from fulfilling their true purpose in the life of the Principality to-day.

At the outset it should be noted that the present county areas originated in a political atmosphere very different from that which now obtains. There is, for example, no longer any danger that the Severn and lower Dyfi valleys will be menaced by the descendants of the tribesmen of Mawddwy, and therefore no reason why their home area should be under a strong government; yet that was possibly why in the 16th century it was put under the control of Merioneth and not given to the new, and untried, county of Montgomery. Similarly, when territory was only vaguely known and still unmapped, rivers were convenient lines of demarcation; but few people to-day would uphold the river as an ideal boundary, even between adjacent counties. Yet over considerable stretches of their courses the Conway, Wye and Teify still act as county boundaries, though admittedly in this respect Wales is in no sense unique. The strategic considerations which affected the decisions of the 16th-century boundary makers are now anachronistic and meaningless. To-day the amalgamation of the police forces of three Welsh counties is a relief to the Home Office and not a threat to the central legislature at Westminster.

From the standpoint of economic geography the changes in local economies during even the last 50 years have been sufficient to destroy any semblance of economic unity that our county areas may once have possessed. The statement from *The Times* quoted by Gilbert that "the petrol engine, the telephone, and vast shifts of industry and population, have transformed the human map of England while leaving the local government map unchanged,"<sup>3</sup> can be applied with equal or even with greater relevance to the map of Wales. Thus the petrol engine makes

<sup>3</sup>E. W. Gilbert. *op. cit.*, p. 172, quoting *The Times* (9th April, 1948).



Shrewsbury an "economic capital" for much of mid-Wales, with Chester as its counterpart further north, while shifts of population have meant that more than one Welsh county has in its entirety become a zone of continuous depopulation. Hence also the industrial development associated with the South Wales coalfield extends into South Breconshire and East Carmarthenshire, and a rural area with an industrial annexe is rarely an easy unit to administer.

Closely linked with the question of local economies is that of the population and financial resources of the present county areas. Of the twelve existing counties, only five have a population of over 100,000, namely Glamorgan, Denbigh, Carmarthen, Flint and Caernarvon. Reference to the *Handbook of the County Council* of one of the remaining seven counties with a population of 45,989 in 1951, reveals that the administration of the area has necessitated setting up 51 committees and sub-committees. This is a fair average for rural counties in the Principality, and if it be considered that three such contiguous counties, e.g. Brecon, Radnor and Montgomery, which together have a population which is less than that of Cardiff, require a total of 150 committees for local government, then there would appear to be room for some reorganisation affecting the size of these county areas. The problem of financial resources reveals the same difficulty. If the same rural county, with its 45,989 inhabitants be taken again as an example, its planned expenditure for 1949 was just short of £1,000,000. Its rateable value is £174,000, and the total income from grants and from rates at 15/6d. in the £ was estimated for 1949 to be £843,000. If such rural counties therefore, are to maintain their frequently very high standards in the provision of social services and amenities, they will find difficulty in doing so without increasing the rates, and most county councillors understandably keep at least one eye on the next election. Some alleviation of the financial burden is admittedly provided by the new Exchequer Equalisation Grant, which operates on a *per capita* basis, and is not dependent on the rateable value, which in a farming area can be extremely low indeed.<sup>4</sup> Even so, however, disparity of financial resources, with consequent discrepancies in the extent and quality of the social services, is bound to occur if the areas of the existing Welsh counties remain unchanged.

Finally in his critical examination of the present county areas, the political geographer has to consider the question of local or regional patriotism within the Principality. If the existing county areas represent cultural units, then it would be dangerous to meddle with them even though there might be strong economic justification for so doing. One important index of culture is that of the language habitually used by the people, and it would be both difficult and most unwise to attempt any detailed forecast of the pattern which will be revealed by the 1951 census, for much has happened in the 20 years since 1931. It can safely be assumed, however, that the linguistic map of 1951 will show a

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<sup>4</sup>The county of Essex has a rateable value higher than the whole of Wales. *Report*, p. 37.

marked cleavage within the counties of Brecon, Montgomery and Pembroke, together with "pockets" of language difference in those of Denbigh, Cardigan and Carmarthen. With few exceptions therefore, the present county boundaries will show no correlation with those of the linguistic map. Another aspect of the culture pattern, important in this context, is the feeling of local patriotism, and though this is somewhat intangible, and generalisations on the topic are dangerous, it is possibly less marked in Wales on a county basis than it is in England. County patriotism does exist, but in general, local patriotism in the Principality is possibly more regional than county in character, and terms such as "Northman," "South Walian" and their Welsh colloquial counterparts, e.g. "Southyn" are in more general use than "Caernarvonshire man," "Glamorganshire man," etc. There are notable exceptions, however, and the term "Cardi" for a man who comes from Cardiganshire is one. Doubtless this "subdued" county patriotism would be sufficiently strong to protest against the abolition or partition of a county, but what is more important is that it might not object to the merger of several contiguous county areas. There would, for example, be far less of an outcry if a merger were to be suggested between Merioneth and Caernarvonshire than if the same suggestion were to be made for Lancashire and Yorkshire!

It can thus be seen that the existing Local Government areas of Wales are not only frequently divorced from the contemporary life of the Principality but that by virtue of limited size and resources they are finding difficulty in maintaining and developing the social services. While it would therefore appear to be axiomatic that the present areas should be enlarged, it is by no means easy to decide to what extent this should be done. It is emphasised here that there is no suggestion of transferring powers to some form of *central* government; what is under consideration in this paper is the creation of new *local* government areas which would lie between the present Rural and Urban Districts and a central legislature. To such new areas the term "Local Government Region" might be applied. Unfortunately for this terminology, there are already in existence "regions" of devolution or decentralisation of governmental function from Westminster, e.g. Coal Board Regions, Electricity Regions, etc.<sup>5</sup> These "civil service" regions are of necessity very large; their purpose is to break down the central government into less unwieldy units, and Wales usually forms one, or at the most, two such regions. The "Local Government Region" on the other hand would be much smaller, and should be built up from existing units. It should be a synthetic and not an analytic unit, and it is in this context that the term Region will be used in the remainder of this paper.

The dual question is therefore how large a Region, and what sort of a Region is necessary to replace the outmoded existing local government areas of the Principality. The Boundary Commission suggests that no new county area should possess a population of less than 200,000,<sup>6</sup>

<sup>5</sup>E. W. Gilbert. *op. cit.* Figs. 4-11, and Figs. 16-20.

<sup>6</sup>Report, p. 20.



though the Commissioners emphasise that some areas will require "special treatment."<sup>7</sup> The new Regions should be large enough in terms of population to be efficient, yet not so large in acreage as to be unwieldy, or to lose character. The emphasis throughout should be on "Local," and not so much on "Government," and the feeling of governing should not be outweighed in the citizen by that of being governed. Furthermore in a country where cross-country transport facilities are by virtue of physical and economic geography notoriously bad or even non-existent, the problem of how to travel to committees is one already presenting difficulties to many county councillors. The creation of very large Regions would therefore mean that membership of their authorities might be confined to retired people, or to income groups with cars, or to people of sufficient means to absent themselves from work in order to attend committees. This leads directly to the problem of the choice of Regional capitals, and in Wales, few topics are better calculated to inflame local patriotism than this.

The question of the size of the Region must however be considered in conjunction with that of the type of Region which is needed, and it may well be asked whether there are already in Wales any regions which could be used as a basis for re-casting the boundaries of the present counties. Physical regions fail us completely, for in order that they may be homogeneous or balanced regions the country must be subdivided into a very large number of areas, many of which would be smaller than the existing counties. Regions based on language would likewise be unsatisfactory, for their use, for example, would mean detaching the anglicised lowlands of the north coast and of the borderland from their Welsh-speaking hinterlands. Local Government Regions based on language would in many cases therefore have no semblance of economic unity, and would cut across the long-standing interdependence of sheep farming on the moors and mixed farming in the valleys.

One scientific method of determining geographic regions on the basis of local economies is that which uses urban spheres of influence as its index.<sup>8</sup> If the results of this method be applied to our problem, then the chief town of a group of counties might become the Regional capital, and the Local Government Region be formed by the tributary towns and their individual spheres of influence. This is a rational method, based on the everyday life of the community and on the interrelation of town and country, and as such is theoretically admirable for our purposes. In practice, however, its application to the Principality reveals considerable difficulties. It has already been suggested that much of east central Wales is tributary to Shrewsbury, and the hinterlands of both Chester and Hereford extend into Wales. Unfortunately, however, any Local Government Regions built, on this basis, around these three towns, would transect the traditional division

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<sup>7</sup>*Ibid*, p. 10.

<sup>8</sup>A. E. Smailes. "The Analysis and Delimitation of Urban Fields." *Geogr.*, Vol. 32, 1947, pp. 151-61.

between England and Wales and this solution cannot therefore be countenanced. Economic considerations are here in direct conflict with those of culture and tradition and the latter are too strong to be flouted. Elsewhere in Wales, the urban pattern is less clear, and displays a large number of small towns all of approximately equal status and function, with few obvious choices for Regional capitals. This is clearly shown by the existing fragmentation of local government functions in such counties as Cardiganshire, where for example the County Education Offices are at Aberystwyth, the Planning Offices at Aberaeron, while Lampeter is the Assize town and Cardigan bears the name of the county. Thus also the administration of Montgomeryshire is divided between Newtown and Welshpool, with Montgomery as the county town in name only, while in Radnorshire, Llandrindod Wells has only recently ousted Presteigne as the Assize town, and then only because of the expense of repairing the Shire Hall in the latter. These small towns and their spheres of influence may be ideal units in themselves, but they will not serve as an economic basis for recasting the existing Local Government Areas. Wales has no native urban tradition, and this method of creating Local Government Regions is not successful.

It would appear therefore that there are no "ad hoc" regions in Wales which could successfully be used as a basis for any new administrative areas. Compromise solutions must be considered, and the four proposals suggested by the Boundary Commission will therefore now be analysed. The Commissioners state that "no major change need be recommended in the county of Glamorgan,"<sup>9</sup> and in the following pages therefore the term "Wales" should be taken as referring to the remaining 11 counties of the Principality.

The first suggestion is shown on Fig. 1, and consists of a broad division of the country into two areas, termed "North Wales," with a population of 560,000, and "South Wales," with a population of 375,000.<sup>10</sup> From the standpoint of physical geography the question is not whether there is physical unity within each region, but whether the internal physical differences are too great for administrative unity. The northern area includes for example the low-lying Anglesey plateau, the Snowdonian peaks and the valley of the upper Severn or Vale of Powys, while the Dyfi estuary, the Brecon Beacons, and the Pembrokeshire coastal plateau are together in "South Wales." It is not suggested that these internal physical differences would prevent the effective administration of the areas in question, but they are obviously sufficiently great to present the administrators with considerable problems.

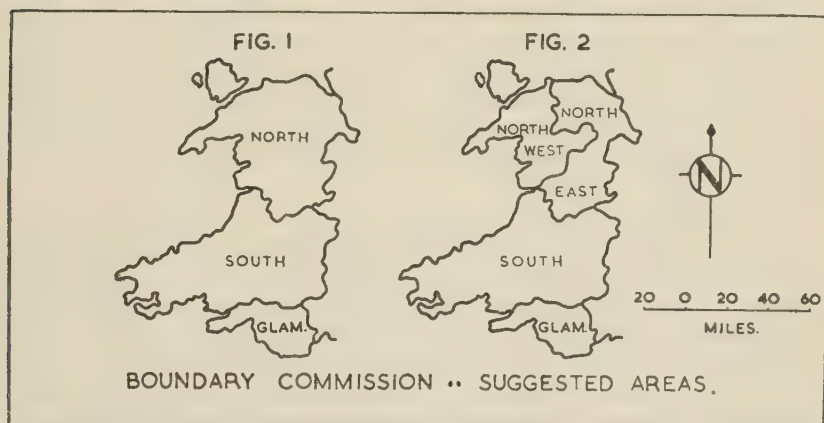
As an economic unit, the northern area is particularly unsatisfactory

<sup>9</sup>*Report*, p. 38. Though this paper is concerned only with major changes, it must be pointed out here that Glamorgan's present county boundaries sadly need re-adjustment if they are to conform with the pattern of economic life in the South Wales industrial area, for the northern rim of that area is at present in Breconshire and the western in Carmarthenshire.

<sup>10</sup>No map is contained in the *Report*, the new areas being described in terms of existing counties. The detailed course of the boundaries of any new area is therefore not known, but it is assumed that minor adjustments would be made in some cases.



including as it does the North Wales coalfield as an appendage to an otherwise agricultural area. In addition this agricultural area has within it markedly different types of economy, ranging from the sheep farming of Merionethshire, through the mixed farming of the Lley peninsula to the growing dairying industry of the Vale of Powys. What is even worse however, is that the boundary between the two areas cuts across the sheep farming bloc of South Montgomeryshire and North Radnorshire. The sheep fairs of Kerry and of Knighton draw on the whole of this area for their stock, and this proposal places the two centres in different areas. There would of course be no customs barrier along the border, but it is desirable at least to approximate the new Regions to economic units.



Social and cultural divergencies within each area are even greater than those of local economies. Anglesey and Montgomeryshire are in the same Region, but there is very little cultural or social affinity between " Môn Mam Cymru " (Mona, the mother of Wales), and " Powys Paradwys Cymru " (Powys, the paradise of Wales). One index of the difference is that of the respective Welsh dialects and idicms, which are as far removed from each other as is the English of Derbyshire from that of Dorset ; another is that while Anglesey has one municipal borough, there are three boroughs of Anglo-Norman origin in the Vale of Powys. In the south also the eastern slopes of the Radnor Forest and the valleys of the Usk and Wye are in the same area as such towns as Aberaeron, Cardigan and Llandilo. The former are virtually annexes of the Plain of Hereford, while the second are essentially Welsh in speech and outlook.

The final condemnation of this suggestion is associated with the problem of finding a regional capital which would be within easy access of the whole of each area. To those who have tried, and failed, to travel easily and quickly from Caernarvon to Newtown, or from Haverfordwest to Brecon, the answer is that no such places exist in relation to existing transport facilities. From many aspects therefore, the suggestion shown on Fig. 1 is most unsatisfactory.

The second proposal of the Boundary Commission suggests a division of the Principality into three new county areas. As may be seen from Fig. 2, the "South Wales" area remains unaltered the two new areas being termed "North West Wales" and "North East Wales" with populations of 210,000, and 350,000 respectively. Consisting as it does of the counties of Anglesey, Caernarvon and Merioneth, the "North West Region" has much in its favour. The unit would have a historical precedent, since it corresponds approximately to the ancient province of Gwynedd, though historical determinism in itself of course is no justification. In this area moreover, the economy is closely linked with the physical background, and consists of a peripheral lowland mixed farming region which integrates closely with the sheep farming of the moorland core. The distribution of population within the unit, while not even, is not such as to cause extreme overweighting in any one part. In addition these three counties are essentially Welsh in speech and tradition, and Bangor is already an ecclesiastical and educational centre in its own right. This area therefore appears to be a reasonable compromise, and might well be very successful as a new Local Government Region.

Unfortunately the same cannot be said of "North East Wales." Here the proposed amalgamation of the three counties of Denbigh, Flint and Montgomery would result in a physical unit whose northern half abuts onto the Cheshire plain, while the southern part is an annexe of the plain of Shropshire. Moreover the existence within the area of the North Wales coalfield would result in a very uneven distribution of population; Denbighshire has 170,699 inhabitants, and Montgomeryshire only 45,989, so that the latter county would tend to be overshadowed. Furthermore, the agricultural produce of the Severn and Vyrnwy valleys goes not to the North Wales Coalfield but to the English Midlands, so that between these two parts of the "North East Wales" Region there is neither an economic link, nor interdependence. This is reflected in the social life and cultural traditions of the people, for there is very little in common between the agricultural and marketing communities of Montgomeryshire and the mining villages of Denbighshire. Newtown and Welshpool have few contacts with Wrexham or Ruabon, and even fewer with Denbigh and Ruthin, so that the problem of finding an acceptable region a capital would be acute. The great disadvantage, however, is that the Region would be demographically top-heavy, and the amalgamation, if effected, might well aggravate and not ameliorate the difficulties of the administrator. While effective therefore in one part of Wales, this second proposal of the Commissioners is elsewhere open to serious criticism.

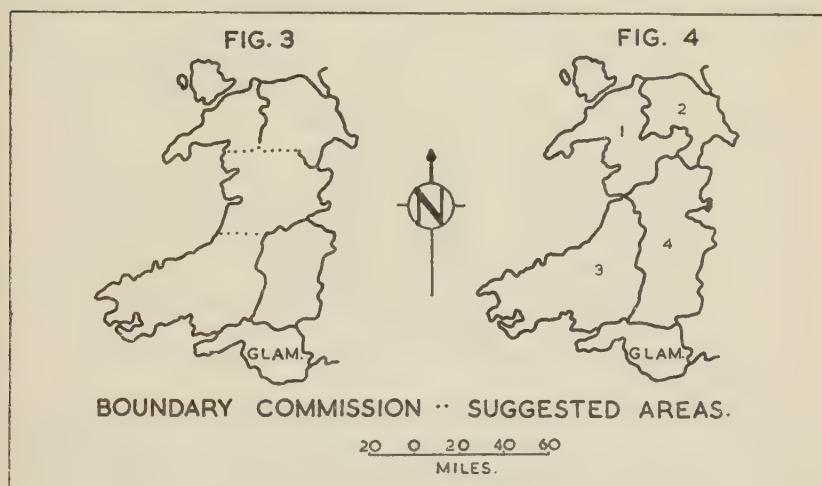
A third suggestion in the *Report* is shown on Fig. 3, and is one which would involve the partitioning of the present counties of Cardigan and Merioneth.<sup>11</sup> While some of the resulting Regis monight form a reason-

<sup>11</sup>Since the *Report* has no maps, the exact lines of partition are not known, the text merely referring to North and South Merioneth, etc. The dotted lines on Fig. 3 are therefore arbitrary.



able compromise, this proposal is damned from the outset by the fact that it necessitates the breaking up of two existing county areas. County patriotism in Wales is strong enough to resent this, and indeed would be strengthened by the mere suggestion. It so happens that one of the counties which would be divided is Cardigan, and this is an area in Wales where local patriotism and "clannishness" are particularly intense. Even if it were possible to destroy these feelings, there is no point in attempting to do so, and this alternative is therefore unacceptable.

Finally there is the proposal which, if adopted, would create four new Local Government Regions (see Fig. 4). Of these, Region 1, North West Wales, has already been favourably considered.<sup>12</sup> The counties of



Denbigh and Flint with a total population of 315,807 form Region 2, and now that the southern appendage has been removed (cf. Figs. 4 and 2), it forms a more satisfactory economic unit, and is demographically no longer so badly unbalanced. Culturally also there is cohesion between the North Wales coalfield and its immediate hinterland which would be united in this Region. The cathedral church of St. Asaph already makes it an ecclesiastical unit, while Wrexham is an important shopping and educational centre which serves most of the Region. It must be pointed out that the Region would embrace an industrial and an agricultural area, but this is offset by the fact that there is much interdependence between the two contrasted economies, and the produce of the Vale of Clwyd for example finds a ready market in the adjoining coalfield.

Region 3 might be termed "South West Wales" and would include the counties of Pembroke, Cardigan and Carmarthen, with a total population of 315,905 (see Fig. 4). Like Region 1, this is a Region with

<sup>12</sup>Since this paper was written, the police forces of these three counties have been amalgamated to form the Gwynedd Constabulary.

a sheep farming core and a periphery of mixed and dairy farming, while with the exception of South Pembrokeshire, language and traditions are Welsh. Moreover, the unit has a historical precedent, for ancient Dyfed covered part of the area. The "cathedral village" of St. David's, ideal as it would be, and indeed was, as a cultural capital for the south-western sea approaches of the Principality, is now too eccentrically placed to act as a regional centre for this unit and this function might well be fulfilled by Carmarthen. Region 3 does not, however, cater for the linguistic dualism of Pembrokeshire, and would still include the eastern margin of the South Wales coalfield, so that if adopted, its eastern boundary at least might need revision.

The final Region is one which has not previously appeared on any of the maps (see Fig. 4). It consists of the counties of Brecon, Radnor and Montgomery (total population 122,471), and would cover part of ancient Powys, and part of the diocese of Swansea and Brecon. There appears to be a unity of pattern in the physical background of this Region. That pattern is one of a number of moorland blocs, e.g. Plynlymon, Radnor Forest, Brecon Beacons, dissected and separated by the lowland entries of rivers draining to the north-east, east, or south-east, e.g. the systems of the Severn, Wye and Usk. Arising from this there is a similarity in the pattern of economic life, for throughout the area there is the interlocking of lowland mixed with upland sheep farming. It is worthy of note that three well-known breeds of hill sheep, viz. Kerry Hill, Radnor, and Clun Forest, have their homes in, or near this Region, a fact which indicates a certain community of agricultural life and tradition.

In culture, much of the Region is transitional between Anglo-Saxon and Celt, and the eastern portions of its three constituent counties are heavily anglicised. It is possible that this very transitional nature gives a character or personality to this part of the Welsh Borderland, a character which might develop into consciousness if a "mid-Wales" Local Government Region were created. On the other hand, the fact that the Region is neither English nor Welsh does not mean that it must be individual, for it may be *in* both cultures, but *of* neither of them. Like "Central Europe" it is transitional; whether political consciousness can result from that transitional characteristic is as yet an unanswered problem. The area is, however, already operating as a unit of Local Government, for some four years ago the county police forces of Brecon, Radnor and Montgomery were amalgamated to form the "Mid-Wales Constabulary," an arrangement which, after some teething troubles has proved eminently satisfactory; moreover, Brecon and Radnor are already united in one Parliamentary Constituency. In spite of its somewhat elongated shape it is possible that this Region could become an effective unit of Local Government, with Llandrindod Wells as the administrative centre, though not unfortunately the economic capital for the whole area. Here again, however, if this suggestion were to be adopted, boundary adjustments would be called for in the south, for while industrial Brynmawr and Ystradgynlais are



at present in Breconshire, they should be excluded from a Region which would otherwise be entirely agricultural.

The four suggestions here discussed were made by administrators, who have approached the problem from the administrative standpoint. While it is agreed that the present Local Government areas should be recast, the foregoing discussion has attempted to review the proposals in terms of the regional pattern formed by the Human Geography of the Principality. As such, all four suggestions are compromises, and all four have serious weaknesses. The present system of Local Government demands larger units than exist to-day. In Wales, large units which are consonant with the regions of the human geographer cannot be formed, for the physical fragmentation of the Principality is reflected in its human geography. The geographer and the administrator are here at cross purposes. If the facts are unassailable, the system is surely not rigid, and a modification might lead to a reconciliation between the now divergent viewpoints.

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## SOME EFFECTS OF ASPECT UPON VALLEY TEMPERATURES IN SOUTH CARDIGANSHIRE

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J. L. DAVIES\*

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THE peculiar climatic conditions associated with valley bottoms and sheltered hollows have been described on several occasions. Hawke (1933, 1936),<sup>1</sup> Heywood (1933), Manley (1944) and Balchin and Pye (1947) give details of British examples of valley climates while Schmidt (1934) describes similar phenomena in Austria. In a survey of the effect of spring frosts on tree growth in 1935, Day and Pearce (1937) deal extensively with "frost hollows," mainly in moorland areas.

During the twelve months from November 1946 to October 1947 inclusive, maximum and minimum temperatures were recorded at three stations near Llandyssul in south Cardiganshire. The instruments used were of the type known as Six's Thermometer and were uncertified, but they were checked at temperatures between 38° F. and 62° F. before installation and were found to agree one with the other. The thermometers were not installed in standard screens but were kept on north facing walls and sheltered from sunshine and rain. In each case they were placed about five feet above ground level and were removed as far as possible from materials likely to influence the air temperatures recorded. Readings were taken at 9 a.m. civil time and in general it

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<sup>1</sup> Full references to the papers mentioned here are given on p. 23.

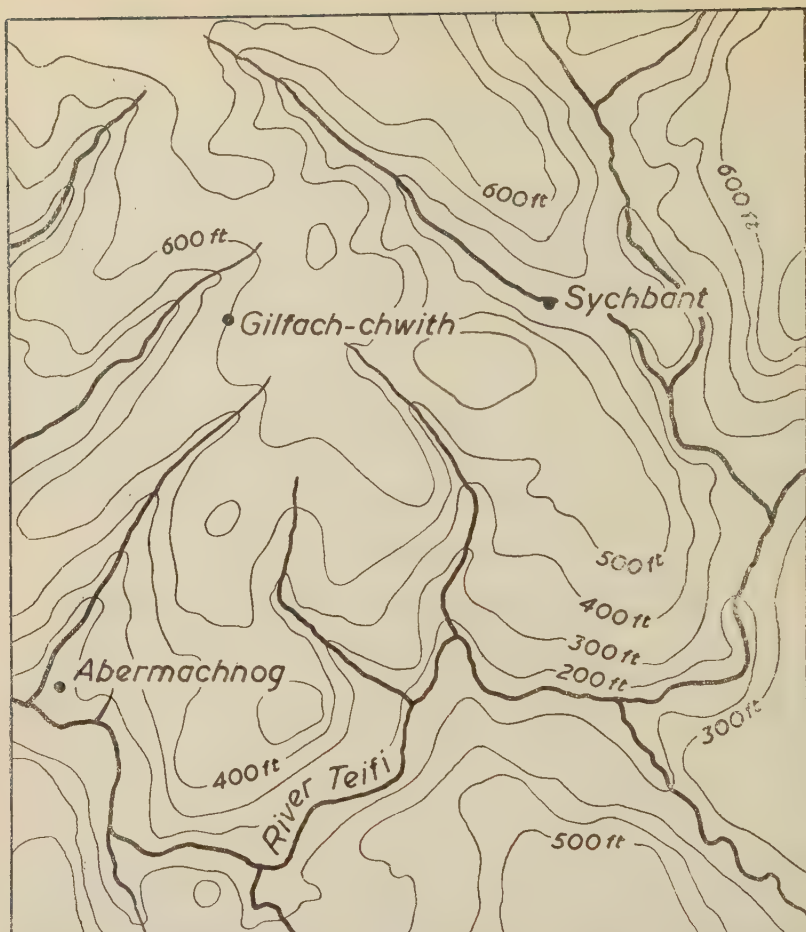


Fig. 1.

was felt that the data obtained were sufficiently accurate to allow comparisons to be made.<sup>2</sup>

The station at Gilfach-chwith was situated at a height of 600 ft. above sea level and was well placed to serve as a basis for comparison with the two valley stations (Fig. 1). The first of these valley stations, Abermachnog, was at the mouth of the Bachnog valley and near to where that stream joins the River Teifi; it was at 150 ft. above sea level. The second, Sychbant, was in the valley of the Nant Ythan at 340 ft. above the sea. Both valleys are flat bottomed and steep sided and the soil is gravelly over a clay subsoil. The sides of the valleys are only partially wooded and air flowing down into the valley bottoms from the surrounding high land meets few important obstructions.

The main difference between the two valleys lies in their contrasting aspects. The Bachnog valley faces a little west of south while the

<sup>2</sup> Observations made under such conditions can have only illustrative value. For a more satisfactory instrumental method see the following article by Dr. Garnett.—*Ed.*



valley at Sychbant faces a little south of east. Gilfach-chwith is  $1\frac{1}{4}$  miles from Sychbant and  $1\frac{1}{2}$  miles from Abermachnog.

#### DAILY READINGS

The characteristics of valley stations—high day maxima on calm, sunny days and low minima on clear, calm nights—are well shown by the readings at both Abermachnog and Sychbant when they are compared with the corresponding readings for Gilfach-chwith. These characteristics are most marked at times when anti-cyclonic conditions prevail and three examples are given below.

#### DAILY TEMPERATURES IN DEGREES FAHRENHEIT

1946	Maximum October				Nov.		1946	Minimum October				Nov.	
	29	30	31		1	2		29	30	31		1	2
GC ..	50	48	50		48	48	GC ..	30	32	37		32	34
AM ..	54	48	50		51	49	AM ..	26	24	29		28	31
SB ..	44	48	48		48	49	SB ..	26	24	32		27	30
1947	April						1947	April					
	9	10	11	12	13	14		9	10	11	12	13	14
GC ..	49	56	56	56	56	62	GC ..	36	38	36	38	41	40
AM ..	52	59	58	58	59	62	AM ..	34	34	33	34	34	36
SB ..	54	56	54	58	60	56	SB ..	34	33	32	34	32	36
	October							October					
	14	15	16	17	18	19		14	15	16	17	18	19
GC ..	56	56	61	58	56	54	GC ..	44	45	53	50	46	46
AM ..	58	56	59	58	60	55	AM ..	44	38	48	42	43	45
SB ..	56	57	57	58	55	—	SB ..	42	36	52	42	43	46

The most spectacular drop in temperature occurred on the night of March 6th–7th, 1947, at which time the ground had been covered by a thick layer of snow for over 24 hours. During the day of March 6th the temperature at Gilfach-chwith had not exceeded 38° F. while the maximum at Abermachnog had been only one degree higher. During the succeeding night a perfectly clear sky, calm atmosphere and the presence of a snow cover—one of the best agents of radiation (Cornford, 1938)—led to a great drop in temperature over the whole of the Teifside slope. At Gilfach-chwith the temperature fell to 18° F., but the drainage of cold air into the valleys led to even more severe frost there. At Abermachnog the minimum was 8° F. while at Sychbant the temperature went down to 6° F.

Such temperature aberrations operate for short terms only and tend to become overshadowed when monthly averages are considered. This is probably especially true in the present instance for neither valley station is situated where the characteristics of valley climates might be expected to be experienced at their most extreme. Both Abermachnog and Sychbant are situated near to the junctions of small valleys with larger ones and katabatic winds are probably subject to considerable interference from air currents of another nature. The soil in the valley bottoms is heavy and damp and streams run past both stations. Neither of these factors is conducive to an exaggeration of daily temperature ranges. Even so the effect of a valley situation is readily apparent in the monthly figures for both Abermachnog and Sychbant.

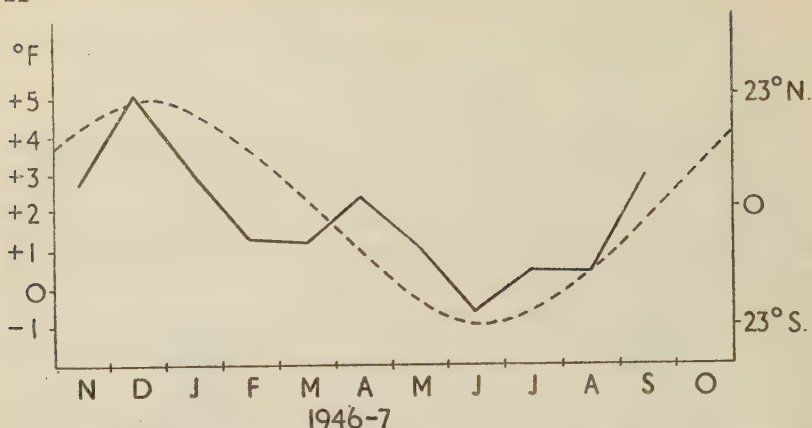


Fig. 2.—The full line shows the variation in 1947 of the excess in °F. of the mean maximum for each month at Abermachnog over that of Sychbant (scale at left). The pecked line shows the seasonal variation in the declination of the sun (scale at right).

#### MEAN MONTHLY MAXIMA

The table below shows that while there was a marked tendency for maximum temperatures at Abermachnog to exceed those at Gilfach-chwith, the maxima at Sychbant were nearer to those at the upland station. There was some seasonal variation in this, however, and this is made more evident by a comparison of the mean maxima for the two valley sites. This is done graphically in Fig. 2, which shows that the excess of the mean maximum at Abermachnog over that at Sychbant was greatest in December, while in June the mean maximum at Sychbant actually exceeded that at Abermachnog. Fig. 2 shows further that in 1947 there was a distinct correlation between this difference in mean maximum and the declination of the sun. At Abermachnog the valley faces southward and receives maximum insolation at all seasons. Its sheltered position ensures little disturbance of the air which is warmed by contact with irradiated valley sides and valley floor. The result is that day temperatures at Abermachnog are generally higher than at Gilfach-chwith, especially on calm, sunny days. At Sychbant on the other hand, the valley faces eastward and for much of the year the sun never shines down into the valley bottom but is hidden by the high land to the south. Very little of the land surface of the valley becomes heated—normally the northern slope only—and as a result day temperatures are comparable with those at Gilfach-chwith rather than those at Abermachnog. In May, June and July, however, when the declination of the sun is at its greatest in the northern hemisphere, the Ythan valley gets enough insolation for day maxima to exceed those at Gilfach-chwith and in June, at the summer solstice, the mean maximum was higher than at Abermachnog.

#### MEAN MONTHLY MINIMA

Clear calm nights, which allow of considerable radiation and the setting up of cold katabatic air currents into the valley bottoms, cause



## MEAN MAXIMUM TEMPERATURES IN DEGREES FAHRENHEIT

	GC	SB	AM		GC	SB	AM
Nov. ..	50.6	50.5	53.1	May ..	63.2	64.1	65.1
Dec. ..	42.3	41.8	46.8	June ..	66.5	69.3	68.7
Jan. ..	39.9	39.7	42.6	July ..	68.2	69.8	70.1
Feb. ..	31.2	34.3	35.6	Aug. ..	—	76.7	77.0
Mar. ..	43.7	43.9	45.1	Sept. ..	64.6	64.3	67.0
Apr. ..	52.9	52.8	55.0	Oct. ..	58.2	58.7	—

noticeable drops in temperature at Abermachnog and Sychbant as compared with Gilfach-chwith. This shows up very clearly in the monthly averages for Sychbant where the mean minimum in every month is below that at Gilfach-chwith, but it does not show so markedly at Abermachnog. This is almost certainly because the temperature reached in the preceding day must have a bearing upon the figure to which night temperatures will drop. Clear, calm days are often followed by clear, calm nights, so that at Abermachnog the air will usually be initially warmer than in the less sunny valley at Sychbant. Thus at Abermachnog the mean daily range for every month was very similar to that at Sychbant, even though the nightly minima were more comparable with those at Gilfach-chwith. It is evident that daily range rather than minimum temperature is the true criterion of the effect of a valley situation upon local climate.

## MEAN MINIMUM

## MEAN DAILY RANGE

## TEMPERATURES IN DEGREES FAHRENHEIT

	GC	SB	AM		GC	SB	AM
Nov. ..	42.6	39.6	41.7	Nov. ..	8.0	10.9	11.4
Dec. ..	32.6	30.0	31.7	Dec. ..	9.7	11.8	15.1
Jan. ..	30.4	28.6	30.9	Jan. ..	9.5	11.1	11.7
Feb. ..	25.3	23.4	25.9	Feb. ..	5.9	10.9	9.7
Mar. ..	34.4	32.7	35.0	Mar. ..	9.3	11.2	10.1
Apr. ..	39.9	38.3	39.2	Apr. ..	13.0	14.5	15.8
May ..	45.8	44.0	45.1	May ..	17.4	20.1	20.0
June ..	50.6	49.6	49.7	June ..	15.9	19.7	19.0
July ..	52.7	51.6	52.6	July ..	15.5	18.2	17.5
Aug. ..	56.5	49.3	49.7	Aug. ..	22.6	27.4	27.3
Sept. ..	51.2	45.2	48.8	Sept. ..	13.4	19.1	18.2
Oct. ..	43.7	41.2	—	Oct. ..	14.5	17.5	—

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# THE STUDY OF DIURNAL TEMPERATURE CHANGES

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ALICE GARNETT

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THE variations that occur in the daily sequence of temperature changes are only imperfectly appreciated by many students of geography, largely because comparatively few complete records are accessible for general reference, despite the amount of temperature recording that takes place in one form and another. Yet given access to the records from appropriate self-recording apparatus, we may find in the study of the diversity of patterns, day by day, a subject of absorbing interest that may be shared with quite young observers. For some years the writer has been impressed with the value for teaching purposes—no less than research—of the records of temperature changes recorded by bi-metallic thermographs. These give a continuous record on a chart attached to a slowly rotating drum. Hourly or half-hourly readings can be assessed, if required, throughout the period of observation; the times of maximum and minimum readings can be read as can the duration of spells of temperature above or below critical levels (e.g.,  $42^{\circ}$  F. or  $32^{\circ}$  F.). The charts reveal the limited significance that daily mean values may often have, for in many cases these represent an average derived from readings taken only at a few specified hours of observation or from maximum and minimum values read only once a day, for the preceding twenty-four hours. Such records give no evidence of the variety of temperature rhythms that can occur, as some of the accompanying charts may show.

The normal daily rise and fall of temperature is a fact accepted by our pupils, but do we appreciate the precise form that these customary changes may take? The standard curve of diurnal temperature variation (plotted from the monthly averages of hourly readings) gives a pattern showing certain well-recognised features (Fig. 1). The maximum occurs well after noon, the minimum is retarded to about dawn; the mean temperature increases rapidly during the morning hours, but the rate of increase slows down slightly in the early afternoon. Similarly it falls rapidly in the late afternoon or early evening, but the rate of fall decreases later towards dawn. In some world climatic regions the actual daily temperature record may approximate quite closely to the mean curve. In Britain, however, the sequence of weather phenomena is so varied and the effects of this are so pronounced that a study of the daily records of thermograph charts shows an infinite variety of graphs, a large proportion of which bear no relation to the pattern expressed by the curve of mean values.



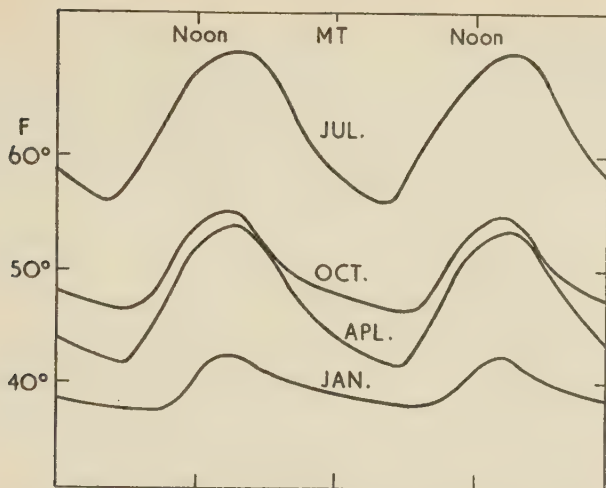


Fig. 1.—Seasonal variations in the diurnal curve of mean hourly temperatures for a station in southern England (Kew).

Under cloudy anticyclonic weather, for instance, the thermograph record may show only a straight line over a period, perhaps, of several days' duration during which air temperatures have fluctuated by less than half a degree Fahrenheit. The effect of cloud or fog screening is then very clearly shown. Cyclonic weather brings quite different variants of the normal pattern. Sometimes, with remarkable clarity, the chart shows the effects of changes brought by the passage of fronts, to bring home to the observer, amongst other basic elements of weather study, the reality of the concept of moving and changing air masses.

Figs. 2-6 are taken almost at random from a large number of charts that the writer has collected to show air temperature records at a number of stations in the High Peak district of North Derbyshire. In every case they refer to stations in the Ashop Valley, and show the contrasted effects of different types of weather conditions. They have been selected to illustrate some of the ways in which these records can be used for teaching purposes. The position of the vertical divisions defining midnight (M.T.) and noon on each chart should be noted with respect not only to the form of the graph but also to the times and duration of periods of maximum warmth or cold. In many cases it will be observed that the "mean" curve pattern of Fig. 1 is entirely lost.

In Fig. 2 (a) the graph shows the advance—relatively rapidly—of a mass of warm *mT* (maritime tropical) air, replacing *mP* (maritime polar) air, such that a late November midday temperature of  $34^{\circ}\text{F}$ . is succeeded during the evening by air that is nearly  $25^{\circ}\text{F}$ . warmer, with maximum temperatures occurring about midnight, not midday. Of course, such a striking change of air mass conditions will have shown itself in a variety of ways observable without the aid of

instruments. Pupils were, no doubt, well aware of the change long before arriving at school, not only from the obvious warmth of the air itself but also from the evidence of streaming walls and ceilings and damp sodden articles that result when warm humid air crosses thoroughly chilled surfaces, indoors no less than outside. The thermograph record at school would, however, have given valuable quantitative information on such an occasion for class and teacher alike.

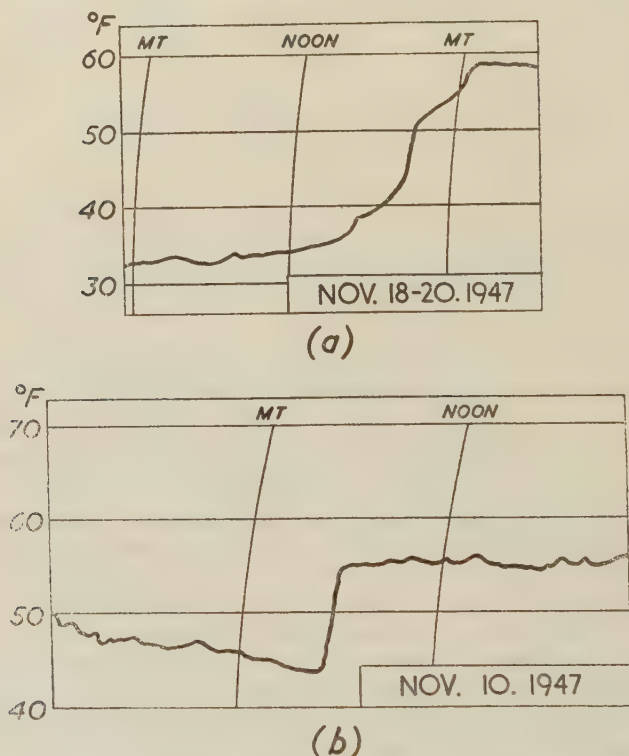


Fig. 2.—Characteristic diurnal changes recorded in successive weeks during the passage of warm fronts (Ashop Valley, Derbyshire, at 700 ft.).

Sometimes the passage of the warm air is associated with a front that gives remarkably abrupt changes, particularly in non-occluded depressions. A case of this kind is illustrated in Fig. 2 (b). At other times warm air masses encroach more slowly (see Fig. 3 (b)).

The advance of cold air masses varies in individual cases. Sometimes it is recorded by a continuous fall of temperature over a period of several days (apart from the effect of numerous minor oscillations that result from the less stable character of *mP* air generally). Fig. 3 (a) illustrates such conditions, when the advent of cold air gives rise, apart from the numerous minor fluctuations, to a continuing (generalised) fall of temperature from 51° F. to 30° F., over a period of 40



hours. On other occasions, however, the cold front can be quite sharply defined. Fig. 3 (b) shows how the passage of warm air is abruptly broken by the onset of colder conditions, the changes showing no relation to the theoretical diurnal temperature curve.

Cloudy anti-cyclonic weather, as noted, often produces temperature conditions that are virtually unchanging by day and night. On the

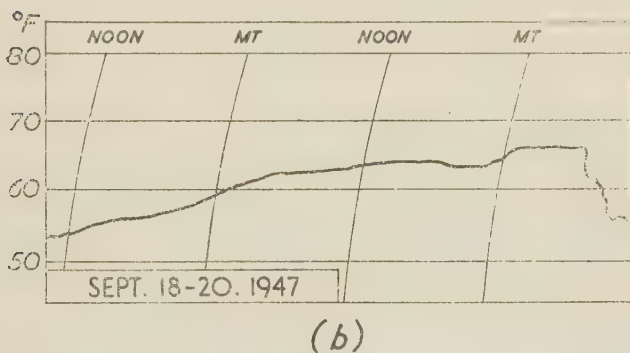
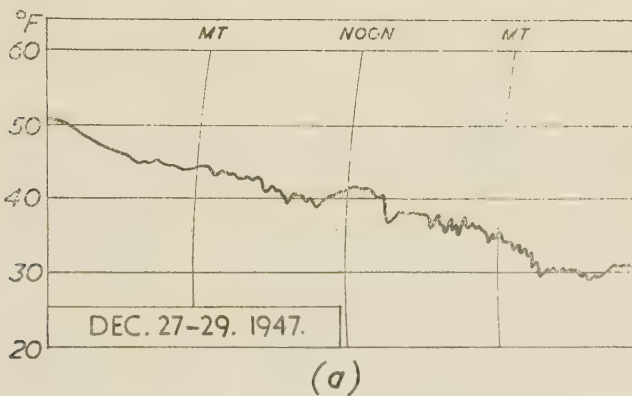


Fig. 3.—(a) (above), Ashop Valley, 700 ft. Advance of cold air. (b) (below), Ashop Valley, 700 ft. Warm air succeeded by well defined cold front.

other hand, anticyclonic weather that is associated with clear skies and dry transparent air normally gives ideal conditions for the development of the mean diurnal curve of Fig. 1. Under these conditions, favouring strong insolation and strong terrestrial radiation, the diurnal range of temperature is often considerable—especially during the spring—and the charts show a daily graph that frequently approximates really closely to the mean diurnal curve, particularly in the summer months (see Fig. 4). But even with ideal anticyclonic weather, quite a number of other curious features may develop to disturb the symmetry of the curve. In some localities, for instance, valley stations seem to be prone to the development of strange bursts of nocturnal warmth. Some of these are to be read from Figs. 5 (a) and 5 (b). The

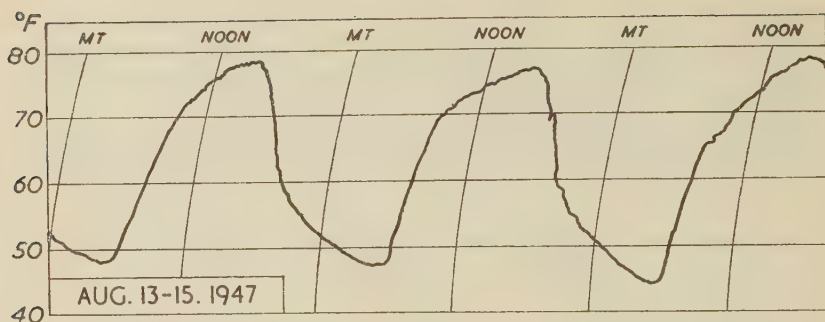


Fig. 4.—Diurnal changes under clear dry anticyclonic weather conditions (Ashop valley, 700 ft.). (Note : Compare with the summer curve on Fig. 1).

record for Fig. 5 (b) is of particular interest in this connection and shows some of the quite extraordinary diurnal changes that may be experienced in the lower Ashop valley during winter anticyclonic conditions. Less spectacular increases of temperature by night are also seen in Fig. 5 (a). Whence, and from what cause, are these bursts of night valley warmth derived? These are questions that pupils and teachers alike will ask. There are many occasions when the problems posed by the records must defy an immediate explanation and there is much to be said for the young geographer in school perceiving that a good teacher admits that he cannot always give an answer to a straight and apparently simple question; that simple questions sometimes give rise to extremely difficult and complicated answers, and that teacher and class must together try to work out some answers if they are to find out what has in fact been happening in nature's vast laboratory outside the school walls. Thus, in the capacity of junior "research assistants" to the teacher, the pupils gain that freshness of approach to the study of everyday phenomena that this type of experimental work can give.

Other kinds of work could be undertaken where schools in one locality can group together to compare their respective thermograph readings, week by week, especially if the school sites happen to include some marked differences in the type of location, for then, local influences of relief or aspect, etc., can be demonstrated, and in some cases assessed. This may be particularly clear, for instance, where one school is located on a hillside or ridge top and another lies in a valley (preferably not far distant). Many differences of temperature regime, resulting from exposure or altitude, may be made evident, but probably the most striking features will emerge when, under anticyclonic weather conditions, local relief induces cold air drainage, and inversion of temperature occurs. Of this phenomenon the pupils may already have been made aware in their observations of the distribution of mists and fogs, of the natural downhill flow of smoke from chimneys on calm evenings or the increasing severity and frequency of hoar frost in the valley as compared with the hill slopes above, even when the



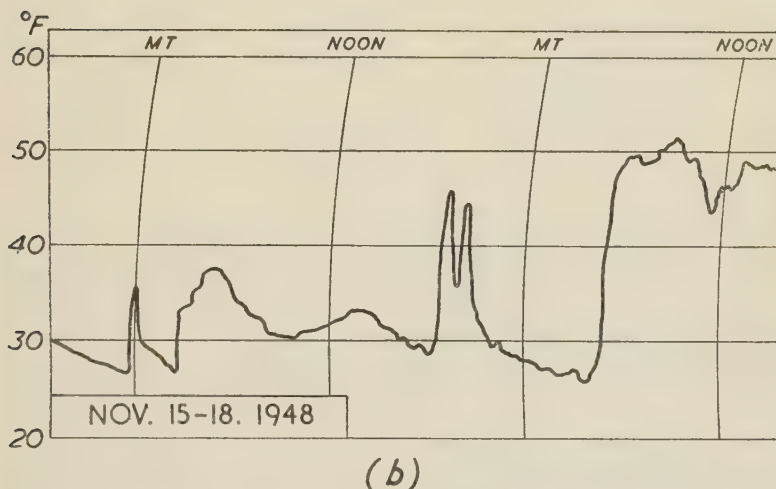
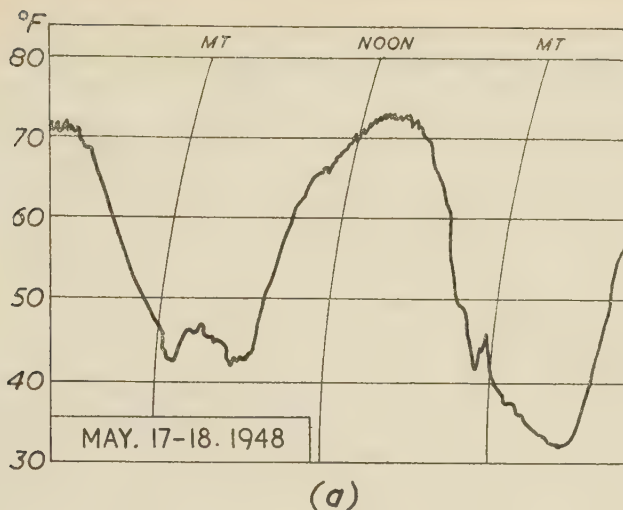
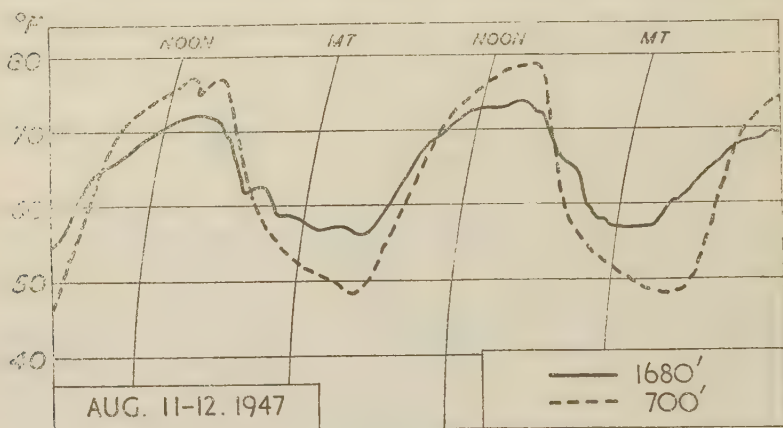


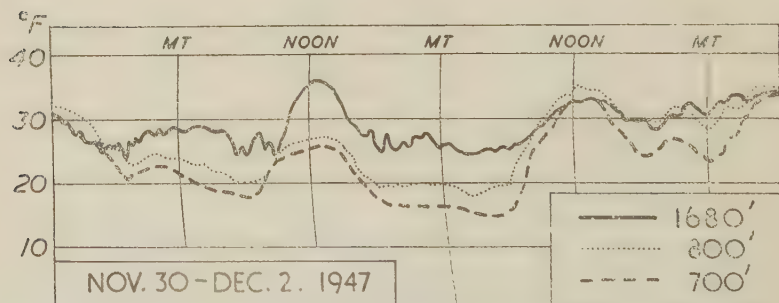
Fig. 5.—(a) Characteristic diurnal range (spring) and night oscillations of temperature under anticyclonic conditions. (b) Unusual winter anticyclonic valley regime.

range of relief is quite slight. The correlation of hill and valley thermograph records with these facts provides an opportunity, however, of measuring precisely the duration and intensity of any temperature inversion that may have occurred. Figs. 6 (a) and 6 (b) show two such cases where, for the same two stations the thermograph charts are superimposed. The examples relate to different seasons of the year. During the summer months the valley station warms up enough by day to break through the inversion and establish the normal lapse rate of temperature; but from about sundown to sunrise the inversion develops, attaining a maximum intensity at about

dawn. In winter, however, the inversion may be much more prolonged. It will persist, under strongly developed anticyclonic regimes, by both day and night, such that, even at noon, the valley temperature may be more than  $10^{\circ}$  F. colder than the slopes above. In the examples given, the difference of altitude between the two sites is nearly 1,000 ft., but many records show almost as marked a difference of temperature under similar conditions for a difference in altitude of only some 300 ft.



(a)



(b)

Fig. 6.—Superimposed thermograph records during anticyclonic weather, for hill and valley stations, showing the contrasting duration and intensity of inversion of temperature in winter as compared with summer (Ashopvalley).

Team work amongst schools using this type of apparatus can reveal many problems in the study of local climate—a branch of geographical study as yet but little explored. Such work brings to the study of climate an appreciation of the need for field work and field observation, and is a stimulus amongst both younger and older students in its revelation of the infinite variety of regimes and strange problems that exist, at present hidden (or at least camouflaged) behind mean climatic data.

These records, as noted earlier, were obtained with the use of bi-metallic self-recording thermographs, and a final word should be given regarding their maintenance.<sup>1</sup> Amongst self-recording apparatus of the kind, the bi-metallic thermograph is relatively cheap and easily installed, whilst at the same time it is sensitive and quickly responsive to small temperature changes. Most models fit easily into a Stevenson screen, which must of course be used, since the coil must be screened from direct exposure to sunlight, precipitation, etc. (This should apply equally to the use of any thermometers; "wall" readings can only have a limited use and interpretation.) The recorder generally runs for a week, but daily supervision should be given if a complete record is to be ensured.

Care must be taken to see that the instrument stands level in the screen and is not tilted forward, otherwise, with a strong wind, the pen arm may swing from the chart and not return to it, and the record is then lost. Too much ink in the pen holder may lead to heavy blotting on the record, such that precise readings cannot be assessed and minor oscillations are lost; very little ink is in fact required. Heavy condensation on the pen and chart can lead again to serious "blotting" of the record so that it may become illegible. Scrupulous care is required when changing the chart, to ensure that the new chart is everywhere set level against the base of the drum. A chart carelessly set on the clock drum must mean faulty recording and distorted chart readings. Finally there are two other more serious sources of error to bear in mind. Left entirely to itself the thermograph is not always a reliable instrument. Ideally one should maintain a tested thermometer in the screen beside the thermograph so that a frequent check can be made on the readings given. When this is not possible a check should be made with a reliable thermometer at least every two or three weeks. If the pen arm reading is found to be a little high or low it can easily be adjusted to the correct temperature by a turn of the coil screw.

Lastly, shielded corrosion is a serious menace if instruments are left unattended and unserviced. It occurs at the point where the coil spindle is coupled to the pen arm. This should be frequently cleaned, loosened and lubricated with a thin penetrating oil, or the pen arm will jam and only a straight line will be drawn on the chart. After such servicing the pen must be carefully reset, against the reading of the standard thermometer that is used for this purpose.

These requirements may seem to suggest that this apparatus is unsuitable for school use, but in fact this is not the case, for with reasonable care it is easily supervised and is strong and serviceable. There is something to be said for work which introduces the young geographer, even at the school stage, to the trials and pains that go with accurate recording; or to the demands that accuracy and precision of measurement entail, and the penalties that arise when

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<sup>1</sup> The current price of bi-metallic and other thermographs can be obtained on making application to standard firms of instrument makers.



these are neglected. To learn how to maintain such records accurately and to know why each of the instrumental precautions is taken would, in itself, surely be no wasted discipline, although not wholly geographical in scope—particularly in the case of classes of pupils whose choice of subjects in other spheres is not made from amongst the sciences. When, in addition, the recording is made a part of a wide study in local geography, and of field work in climate and, finally the results are used as the basis of the teaching of some aspects of climate in relation to wider principles—the time spent on such work is amply justified.

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I have to acknowledge generous assistance from the Leverhulme Trustees, the Royal Society, the University of London, and the University of Sheffield Research Funds, in connection with the installation and maintenance of apparatus used in a wider field of research work from which the above records have been abstracted.

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## “CRAIG AND BEN”—THEIR LIFE AND SONG

### A study of Response to Environment

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ARTHUR GEDDES\*

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LIKE other living creatures, men “adapt” themselves to their environment by what they *do* there in order to find their food and bring up their young. That simple statement, sound for ecology, is sound for economic geography. Outward “adaptation” brings, in the higher creatures, an ever-growing inner “response.” Full human response finds voice in word and music, which may fuse in song.

Now, in the bare, hard environment of cliff and hilltop, of “crag and peak,” man and woman cannot sow to reap, nor build an enduring home; the Glen, not the Ben, is the Highlanders’ real home. On the “cold high hills”—*nam fuar bheann arda*—they must act at the simplest, most primitive level of physical being. Nothing can be seen of man’s achievement, sown or built. That is why the unseen has a special importance if we are to perceive how man—as man, not simply as a dumb creature—truly responds to his life. The Highlanders’ response to their hills, though unseen, can be heard; it is recorded in their songs. Elsewhere I have tried to tell of life in the glens with its songs of home and women’s labour, notably those of the making and

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\* Dr. Geddes is Lecturer in the Department of Geography, University of Edinburgh. Himself a Gaelic speaker and a climber, he has been making verse translations of these Gaelic mountain songs over the last twenty years. A collection of some sixty of them, with their own melodies, appears under the title “The Songs of Craig and Ben,” Vol. I, 1951, *Songs of Daring, Praise and Worship*; Vol. II (in preparation), *Farewells, Love-songs and Lulls*.

wearing of the tartan web, and of its forbidding and regimentation.<sup>1</sup> In this essay I shall speak only of life on mountain-side and peak, on sea-cliff and crag, and of what was felt there by the Gael, as recorded in their ancient, but living, tradition of song.

The strict, even literal, meaning of the words is required here. Yet since strong feeling fused thought and image with tone and rhythm in song, this Gaelic poetry calls for its own airs; their pulse and rhythm sustain the spirit of the words, in English verse as in the original Gaelic. This essay can concern itself only with a few points in interpretation of their meaning to geographers concerned with ecological adaptation and, beyond this, with truly human response.

Men's "adaptation to environment" being essentially their work, a geographer will first seek songs of the chase on the high hills and of hazardous climbing on the sea-craggs in search of eggs, fowl and feather-skins in the outermost isles. In the days of bow and arrow and even of flint-lock musket, the hunt was hard and the hunter might come back worn out, hungry, and with nothing to show for his toil. "Down I come from the Misty Corrie, sorely vexed and joyless—after ranging the deer-forest all day long. I shot at the quarry but my need is not met"—i.e., he missed! "How sad to be travelling over the forest in wind and rain and downpours when urged"—by his wife—"to bring home venison—which puts a hunter on his mettle!" So sang Duncan Ban McIntyre, about 1750–60, when he was "forester" or deer-warden at the head of Glen Lochay, whose river flows into Loch Tay, after a "bad day" had spoiled his hunting. But he ends, addressing his flint-lock gun (his 'Spanish Lady'): "We'll live in hope for a better day!"

We hear of hardship and failure, but still more of the hunter's joy in the splendour of the stag and his tenderness for the hinds, mingled with triumph at success. The chase was needed that the hunter might live. A lament for the forbidding of the chase to crofters ends with a hard word for the landlords who "have taken from us the food God gave" for man, wife and child. And it is right to remember that the Gaelic hunter of old was dedicated to his task, under promise both to respect the young of the creature he hunted and to share a first portion of its flesh with the widow and orphan.<sup>2</sup> But neither dire need, nor the grim stealth of a stalk and the strenuous effort of pursuit, often disappointed, nor yet the satisfaction of a kill with the needed food, hide and horn it brought, could blot out the hunter-poets' sheer joy in their fellow creatures. "Where," cries an unknown poet, "Where have you seen a being"—literally a *person*—"so beautiful, when he travels over the hills, speeds through the forest and lightly climbs the steep . . . as Son-of-the-Deer, *Mac-an-Fheidh* (the stag)?"

<sup>1</sup> Other aspects are discussed by the writer in *Weather*, vol. 4, 1947, pp. 354–9, and vol. 6, 1951, pp. 243–7, and in *Rev. de Psychologie des Peuples*, 6<sup>e</sup> année, 1951, pp. 401–4.

<sup>2</sup> Alexander Carmichael (translator), *Carmina . . . Gadelica* (Gaelic Charms . . .), vol. I, 2nd edit., 1928, nos. 114–5.

In the outermost isles—most notably in St. Kilda—the scanty grain in the wind-swept hollows might be lost and the few cattle and sheep might die on the bare pastures or in the tiny, muck-filled byres, ere spring came. An unfailing source of food and warmth came from the myriad birds on the high sea-cliffs. Bird-nesting (*sunnaradh*) required a team of at least two men. One, who must be young and supple, lowered himself from the cliff-top to the ledges below, while the other paid out the hide-rope from above. Alternatively, when a cliff-foot was reached by boat it led to an upward climb. The rope lessened the risk of a fall by the climber, though if a man were lowered by rope without his having any foothold, and it broke, instant death might follow on the cliffs and skerries below.

Danger called for courage, and gave birth to joy. "O," sang an aging father, "that I were with my laddie on the top of Cleite Gadaig" (a St. Kildan cliff—the word "*cleit*" is Norse); "we'd be bird-nesting and I high above him." But in a different version (to the same air) a girl mocks a young boaster who tries to make love to her but cannot bring her "a gift of eggs from the cliff when he visits her on the Lord's Day." In this form the song is well known as the "*Lilting wee Liar, Breigin binneach*."

To climb was a test of skill and courage, without which a young Islesman could not hope to support a wife and children. This is told in a St. Kildan song once heard by that fine old Highlander, the Rev. Alexander Stewart, "*Nether Lochaber*" (1883). We see the maid watch anxiously, then hear her cry, "Brave, O brave, my lover true, he's worth a maiden's love!" The refrain recalls the height of the cliff, and the depth of the sea below. In *The Songs of Craig and Ben* these fine words are set to an old St. Kildan air.

"The women of St. Kilda are famous for their laments" wrote the Skyeman Dr. Martin Martin, F.R.S., who visited the island in 1699. All too often they had cause to mourn. *Albyn's Anthology*, 1816, contains a "Hirst or St. Kilda song, a lament by a young wife for her own man, *lost* while seeking eggs among the cliffs of the islet of Soa"—in Gaelic, words such as died or killed are avoided by the bereaved. Its haunting melody and touching words should have made the song famous abroad ere now, but that its first translator (the editor of the *Anthology*, Alexander Campbell) was not so at home in English, as in his native Gaelic. The young widow tells: "It was yonder in Soa that I left my fine lad, he who would care for me and bring home the spoil (of the birds)." As if speaking to him, she cries: "Though you went to the crag, you were without fear to hold you back; your foot slipped and you will never rise again." As the climber's life depended on the rope of raw-hide thongs, the *lôn*, so she and his mother had depended upon his skill and strength and were lost now that his life, like the rope, had broken. "O seven-fold blessing of your friends (your family), in our need, you were our strong rope . . . My share of the birds are screaming (uncaught) in the clouds. It was yonder in Soa I left my fine lad."





Fig. 1.—St. Kilda village, bay and "puffin slopes" of Dùn beyond.

Fig. 2.—Finlay McQueen, a notable St. Kildan fowler, snaring puffins, 1938.





Fig. 3.  
Gannet cliffs  
on Boreway.



Fig. 4.  
Stac Lee,  
St. Kilda.



Beyond the immediate response of human feeling to action in environment there came a sheer joy in nature, in the beauty of hill and hollow, crag and summit-peak, in flowers and living creatures close at hand, and in the commanding views far over "bens and glens." How early this enjoyment first found expression cannot be said. All we know is that the oldest poems of the saints and the earliest "lays of the Fenian heroes," both dating from over a thousand years ago, are credibly linked to much earlier traditions. They show a love of sights and sounds seen and heard in the wilds which is not found in other European poetry in so distinct a form until the Romantic period. Happily, the unity of Highland clanship by which chief and people claimed to be kin, led them to listen together to the same songs, until 1745 and after, and even to this day.

Thus the Classics were sometimes echoed in the poetry of the people, while the people found fresh encouragement when Europe took up the themes of their songs. Alexander Macdonald, a lettered poet, who fought for Prince Charlie with sword and song, knew something of Latin and Greek and was stimulated to turn to Gaelic poetry of nature by the English verse of his Lowland fellow-countryman, James Thomson of "The Seasons." The poetry of Macdonald stirred his younger contemporary, Duncan Ban MacIntyre, an illiterate "forester" or warden among the lonely deer forests who was versed in traditional poetry from the lays of Ossian (to whom he often alludes). MacIntyre's "Praise of Ben Dò'rain" is a magnificent eulogy of a single mountain. Set to the "air of a pibroch" with its recurrent stately theme and variations, its 550 lines tell of the mountain forms, the flowers and deer, and the poem only quickens to the excitement of the deer-hunt in the rapid *finale*.

The tradition lives on. In the Hebrides one may still hear the lays of Ossian as James Macpherson heard them there and in his native Strath Spey. Thirty years ago one could still hear these lays sung traditionally by old men even on the mainland of Argyll; and I still return there to hear the poems of Duncan Ban MacIntyre quoted by old friends on the hill or at the fireside. Here and there a living poet, lettered or unlettered, still composes in Gaelic upon native themes. The ancient religious poetry of the people which is full of profound response to experience on land and at sea has, fortunately, been recorded for the Scottish Gael as for no other Celtic people, notably by Alexander Carmichael in his volumes of traditional hymns and prayers, *Carmina Gadelica* (1900-1941). Frowned upon by stern Evangelicals and largely discarded by Catholic priesthood, this religious poetry has almost passed out of use, but its significance endures.

Yet although traditions still live on, the Gaelic is steadily retreating. A fundamental geographic cause is given in "Up with the Gaelic! *Suas leis a' Ghaidhlig*," a rallying song of the Highland Association for language and music, *An Comunn Gaidhleach*, whose annual *Mod* forms our Scottish Eisteddfod: "While the mountains stand and the rivers



flow, never shall the Gaelic die!" No poet ever pronounced a truer geographical dictum! Unfortunately for the survival of Gaelic speech, the mountains are tunnelled and traversed by smooth routes, while the rivers are bridged, dammed and diverted; they cannot be said to stand or flow as once they did. If Gaelic tradition in poetry is to be carried on it must be re-embodied in English words, airborne on the wings of Gaelic melody. Now, the people cannot stand falsehood in translation. When they find it—only too commonly—in print, they sigh that English can never render the sense and word music of their dying tongue. But when they discover the faithful and melodious translations of a Pattison, a Campbell Shairp or a Kenneth Macleod, reset to ancient melody, they exclaim with surprise and rejoice that the spirit of their songs, of land and people may yet survive and live anew.

Gaelic poetry of "craig and ben" reveals a profound response to the beauty of nature in the "pagan" sense we all enjoy, and to the glory of its marvels as the message of the Trinity to man. Its content makes its prose translation worth intellectual study by the geographer as a swift and direct response to environment. So high a level of description, imagery and even of thought is only possible among a people repeatedly in touch with the ascent of European culture from earliest Christianity, while its strong native strain maintained itself because of repeated isolation by distance and poverty, and by invasion of Anglo-Saxon, Viking, and Anglo-Norman. Nor is this study a matter simply of intellectual analysis; it offers an opening field of enjoyment. Whether in daring or in contemplation there was an enjoyment of the wild for its own sake, which the youth of Britain are now recovering upon the peaks and cliffs, an element of environment essentially unchangable whatever transformations are achieved in strath and glen. And finally, the poetic attainment and potentiality of English and its rhythmic quality make it adaptable to render the vowel-rhymes or "assonance" and the rhythms of the Gaelic. Spoken and sung in English verse, their songs may again convey the response of the Gael to our mountains.

# THE MAPPING OF CENSUS RETURNS OF OCCUPATIONS AND INDUSTRIES

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H. R. WILKINSON\*

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THE various volumes of the Census of England and Wales have long constituted an indispensable source of statistics for the compilation of maps depicting the distribution, growth and movement of population in the two countries. But comparatively little use has been made by geographers of the data provided in the various volumes bearing on the "material occupations, pursuits and industries of the people." An examination of the occupational returns reveals some of the reasons for this reluctance. They form, to quote the General Report of 1881 "the most laborious, the most costly, and, after all, perhaps the least satisfactory part of the Census." But, however unpalatable is the fare which they provide, the returns of occupations do incorporate a great deal of valuable evidence on the distribution and nature of economic activity in Britain since 1801, and in the absence of other adequate data this evidence deserves more careful geographical treatment than it has perhaps hitherto received.

The essence of geographical treatment is to map the census data with the aim of making clear any significant regional variations. The Registrar General has himself, in the past, appreciated the importance of the cartographical method for in 1851 he requested the German cartographer, A. Petermann, "to construct a map from the tabular data with which he was supplied (in order) to render this (great variety of occupations) evident to the eye and to give a general notion of the distribution of employment over the face of the country." Petermann obliged with a map in which he employed a number of "quaint, ingenious and suggestive devices" to represent the various crafts and trades<sup>1</sup>. Symbolic portrayal of occupational diversity still has its uses but the geographer is more concerned to-day with quantitative cartographic techniques. In attempting to apply these methods to occupational statistics, certain problems are met because census data have never been assembled with a view to subsequent geographical analysis.

## CLASSIFICATION OF OCCUPATIONS AND INDUSTRIES

*Diversity of Occupations.*—Before these statistics can be mapped they have to be reduced to a few manageable categories. The first problem in the geographical analysis of occupational statistics is the wide range of occupations which have to be dealt with, and the variety of classifications which have been adopted in various census returns.

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<sup>1</sup> *Census of England and Wales*, Vol. 3 (1851).

In the Census Report of 1861, the reader was reminded that the task of occupational tabulation was enormous since "the British people are very ingenious and very industrious . . . as there is scarcely a mineral, a plant or an animal on the earth or under the water that they have not undertaken to move, to modify, or to make subservient to some use." As a result, many and diverse are the occupations of the British people. Some of them are well known, but what are, for example, *egggers*, *dolers*, *fasters* and *flukers*? Or, how does one classify *piano punchers*, *bull-dog burners*, *buttoner-ups*, *muck rollers* and *orange raisers*? Such occupations are not even easily identified and the task of classifying them has always been a formidable undertaking even for the staff of the Registrar General.

*The History of Attempts at Classification.*—In the first Census of 1801, only three classes of occupations were distinguished. They were: 1. Persons chiefly employed in agriculture; 2. Persons chiefly employed in trade, manufacture or handicraft; 3. Other persons not comprehended in the two preceding classes. In spite of the apparent simplicity of this scheme, the Census officers or *overseers* experienced great difficulty in placing the various occupations which they encountered during the course of their house-to-house surveys and their interpretations were so inconsistent as to cause the results of the Occupational Inquiry "to be declared practically useless." The procedure, however, was not varied until 1831 when occupations were reclassified under seven main headings. In 1841, local *overseers* were relieved of the onerous task of classifying occupations according to written instructions by means of a house-to-house survey. Instead they were required only to supervise and correct, if necessary, the entries made in the householders' forms. Interpretation of the contents of these forms was undertaken by a specially trained staff and thus standardisation of results was improved. In that year, 877 occupations were listed and grouped into sixteen classes. This system was extended in 1851 to include 17 classes and 91 sub-classes. These were redesignated Orders and Sub-orders in 1861 and this system of Orders has formed the basis of all subsequent census returns of occupations.

In the same year, 1861, the principles underlying the "New Classification of the People according to their Employments" was explained by Dr. Farr (Statistical Superintendent in the General Register Office). In the Appendix to the Report of 1861 he wrote, "Two great classes have been distinguished by the political economists: those who are unproductive and those who create products. It is by the nature of these products that people are classified into occupations." Farr's scheme was therefore "industrial" rather than truly "occupational." It was based not on the kind of work a person did, but on the product he worked in, at, or for. An example will make the distinction clearer. Commercial clerks may be associated with coal mining, shipping, insurance, or with a host of other activities. Under Farr's scheme clerks in coal mining were classified under coal mining, clerks in shipping under shipping, and so forth.



Farr's scheme was subsequently modified. In 1881, for example, all commercial clerks were extracted from the various industries and tabulated under one heading—that of *Commercial Clerk*. This and similar modifications seriously reduced the value of the comparison between one set of census returns and another. Comparisons are difficult in any case because rapid changes in economic structure during the second half of the century meant the decay of many traditional occupations and the development of new ones. By 1891, the 431 occupational divisions distinguished in 1861 had been compressed to 347, but by 1901 the number had risen again to 382 and by 1911 to 472. A hybrid classification of occupations and industries had then imperceptibly come into being. Its value was limited because it gave a satisfactory picture neither of occupational nor of industrial structure.

*The Introduction of the Twofold Classification.*—Before the Census of 1921, the Census Joint Committee felt obliged to arrange for the subject of occupations to be specially considered by a sub-committee with a view to arriving at a more satisfactory system of classification. The sub-committee appointed included representatives of the Home Office, the Ministry of Labour and the Board of Trade. It came to the decision to separate the returns formerly made as occupational into two divisions, occupational and industrial. Thus all employed persons were to be classified twice, first according to the type of work they did, *i.e.*, their occupation, and second, according to the product they were working to produce, *i.e.*, the industry they worked for or in. The twofold classification was used in 1921 and, with minor modifications, again in 1931. No direct comparison therefore is possible between occupational returns in the Censuses for these two years, and those for any preceding census years. In the new Occupation Tables of 1921, about 30,000 occupations were distinguished which were classified into 32 orders and some 600 sub-orders, and in the Industry Tables about 9,000 industries were distinguished which were classified into 21 orders and some 400 sub-orders. An example of the distinction between Industry and Occupation may be helpful. A carpenter working in ship-building was classified in the Industry Tables under the order, *Manufacture of Metals, Machines, Implements, Conveyances, Jewellery, Watches*, but in the Occupation Tables he was classified under the order, *Workers in Wood and Furniture*. The decision to have two independent classifications removed many of the anomalies to be found in the earlier occupational returns. Even so, the new Occupation Tables were not entirely satisfactory. The necessity of reducing some 30,000 occupations to a limited number of orders compelled the classifiers in spite of their professed aims to fall back in the end on products rather than processes in their classification, for example, *Workers in Wood and Furniture* was a semi-industrial category. Other orders such as *Painters and Decorators* and *Clerks and Draughtsmen*, which also occur, were more truly occupational. This problem was recognised in the Report of 1931 which stated,

"In the absence of full recognition of the fundamental difference between principles of grouping, classifications have been framed which although described as occupational, prove on examination to be largely industrial."

#### THE REGIONAL BASIS OF THE RETURNS

*Regional Details.*—To show the "general diffusion" of occupations over the face of England and Wales has always been the declared policy both of the Census Commissioners and of the Registrar General and his staff. As early as 1831, detailed returns of occupations were given on a county basis and in 1841 the scope was widened to include certain towns. Policy in 1861 was in accordance with the statement made in the Appendix, "It must be borne in mind that the Census is a topographical as well as a national survey." A table was incorporated in this Appendix which showed the "distribution of Principal Local Occupations in 1861." It constitutes an invaluable introductory source for the study of the kind of manufacture practised in England and Wales in that year and of its general distribution. As a measure of its value a map based upon information in the table has been drawn showing the broad distribution of coal mining in 1861 (Fig. 1). The importance of various localities may be assessed because totals of the number of miners residing in each locality were included in the table.

In 1881, returns of occupations were being made for each Registration County, and for each Urban Sanitary District with a population exceeding 50,000 persons. The tabular results of the 1901 Census incorporated even greater regional detail. For each Urban District with a population exceeding 50,000, and for the aggregate of the Rural Districts of each Administrative County full details were given; in addition, condensed lists of occupations were included for each Urban District with a population exceeding 5,000. In 1921 the condensed list was extended to include even those Urban and Rural Districts with a population less than 5,000. Thus by 1921, some information was available for each Urban and Rural District in England and Wales. It is of interest to note that when the returns of the recent census of 1951 are compiled and published information will be available about the distribution of occupations and industries within the great conurbations of England and Wales.

*Place of Work and Place of Enumeration.*—A certain divergence between place of work and place of enumeration must always be considered when census returns of occupations and industries are being mapped. The divergence has been much greater since 1911 because of the increased efficiency of municipal transport systems in catering for large numbers of workers moving between place of residence and place of work. Unfortunately, nearly all the census returns of occupations and industries are based on place of enumeration and not on place of work. The exception is Table 4 of the Industry Tables for 1921 in which an attempt was made to give some regional details of industries based on place of work. In the Report of 1931 it was stated, "It is to be observed in regard to tables showing the areal

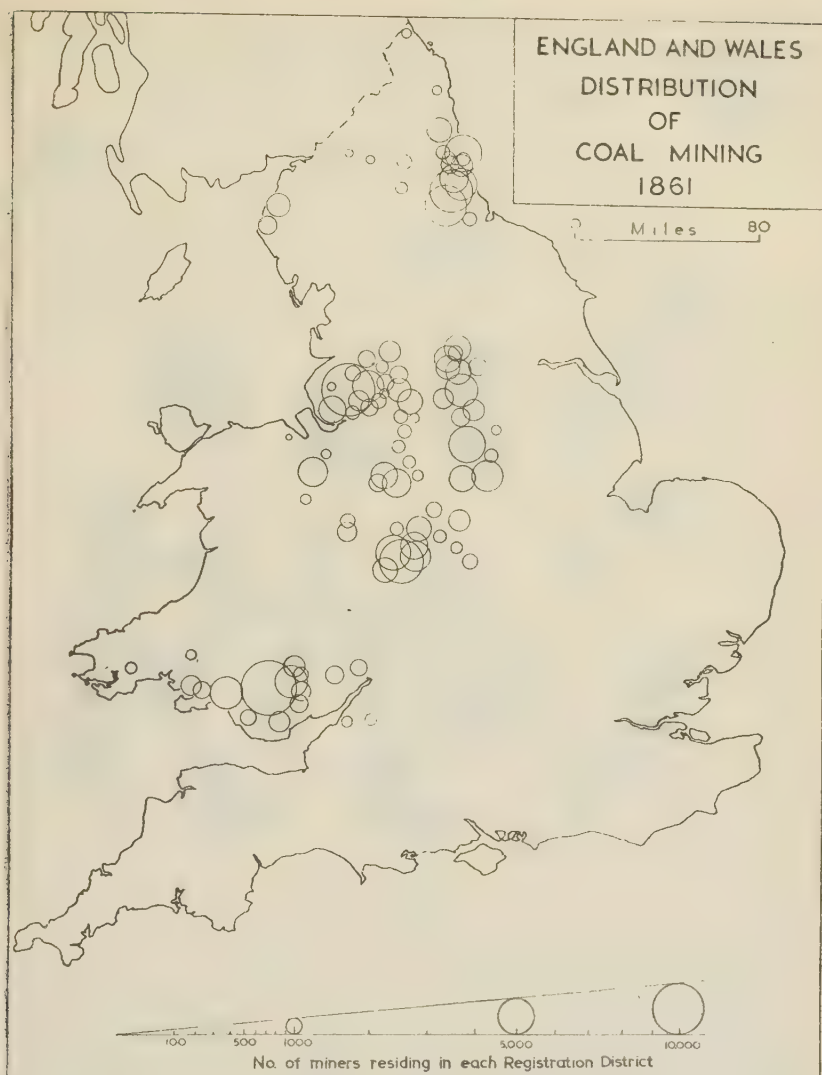


Fig. 1.

distribution of industry that the areal classification is throughout based on the individual's place of enumeration and that this may not be the same as the area in which his place of business is situated. Information regarding the latter was not obtained in 1931 and its inevitable disregard may for some purposes introduce an element of incongruity." This statement means, in effect, that great circumspection is necessary if the occupational and industrial data of the Census of 1931, and indeed of preceding censuses, are to be used to show, for example, location of industry. Geographers and planners do not seem always to be aware of the inadequacy of census data in this



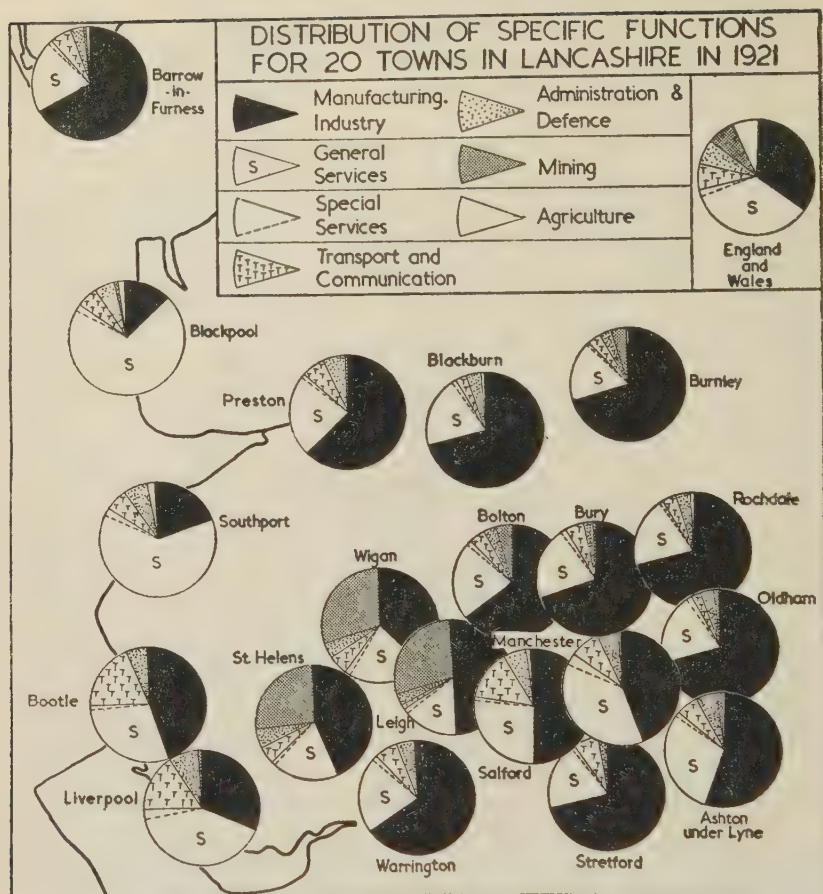


Fig. 2.

respect. More detailed information in the future on place of work would greatly improve the usefulness of this aspect of census data.

*Some Methods of Mapping Available Data.*—Table 4 of the Industry Tables of the Census of 1921 provides some useful data about the chief functions of, and the location of industry in, the large towns of England and Wales in that year. An exhaustive analysis of this data would not be proper in this paper but some hint may be given of its possibilities.

The study of the functions of towns is a useful method of ascertaining their chief characteristics and may help to explain their morphology and distribution. Classifications of towns on a basis of function is greatly aided by data on the industrial activities of the persons working in the towns. Such data are available in Table 4 where, for 30 towns in the two counties of Lancashire and Cheshire, details are listed of the number of persons engaged in each of some 400 industries.

There are many ways in which these industries may be classified for the purpose of cartographical representation.<sup>2</sup> But for the purpose of a functional analysis they have been grouped into seven categories, each of which may be said to represent certain basic functions. The

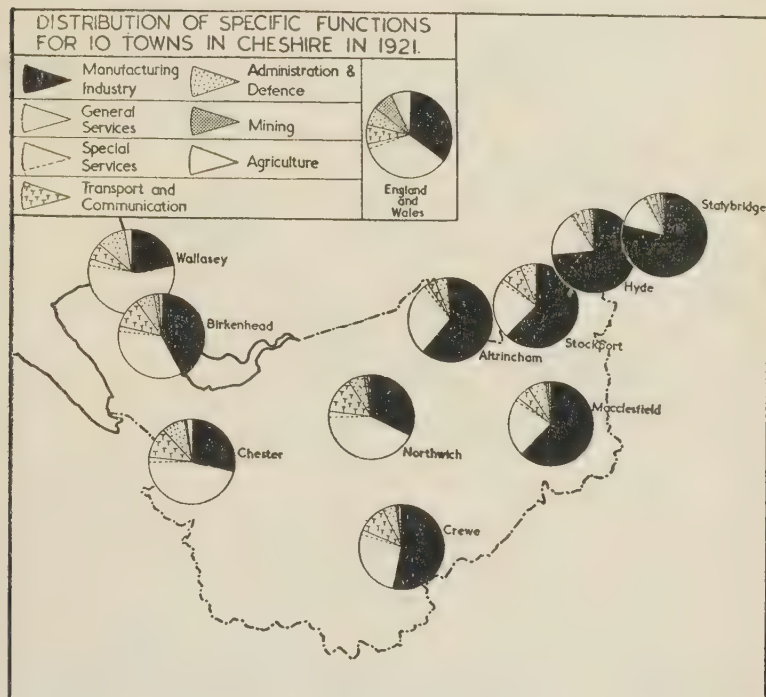


Fig. 3.

total number of persons engaged in each category has been calculated as a percentage of the total engaged in all seven, and the results have been represented cartographically for all 30 towns (Figs. 2 and 3).

#### 1. *Manufacturing.*

In this category have been included all persons "industrially" engaged in manufacture of all types, including "making-up" industries such as tailoring, millinery, boot-making, and food manufacture. From the map it appears that in 1921 manufacturing was an outstanding function of the towns of northern and eastern Lancashire, and of eastern Cheshire. For Blackburn, Burnley, Bury, Oldham, Rochdale and Stretford in Lancashire, and for Stalybridge in Cheshire the manufacturing function was over twice the average of that for England and Wales as a whole. For Barrow-in-Furness, Preston, Warrington, Altrincham, Crewe, Macclesfield and Hyde, it was not so high but was still appreciably above average. By contrast the

<sup>2</sup> Classifications utilising such data have been attempted for example by C. D. Harris, "A functional classification of cities of the U.S.A.," *Geographical Review*, Vol. 33, 1943, pp. 86-99.

towns in the western districts of both counties had manufacturing functions very much lower, particularly Blackpool, Southport and Wallasey. Even of the big centres this was true, Liverpool's manufacturing function being considerably less than that of Manchester.

The manufacturing activities of each town may be analysed in more detail along the lines indicated in Fig. 4. For the purpose of elucidation of the method the manufacturing function for 10 Cheshire towns, respectively, has been broken down into six divisions. The

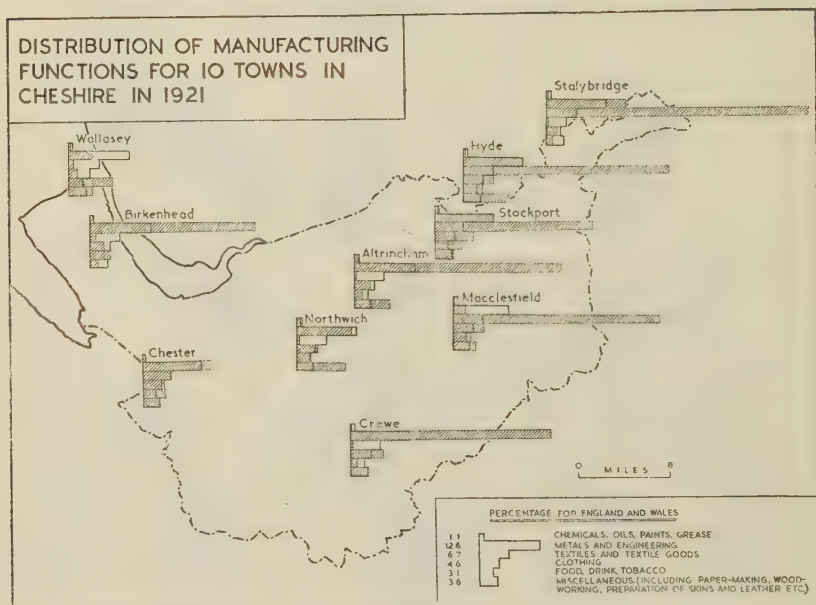


Fig. 4.

number of workers in each division has been expressed as a percentage of the total number of persons engaged in manufacture in each town, and these percentages have been expressed in the form of a "profile" graph, local profiles being superimposed, in each case, on the profile for England and Wales as a whole. The degree of localisation of any of the six divisions of manufacture may be quickly and accurately appreciated by this method. Thus metals and engineering predominate in the manufacturing structure of Birkenhead, Crewe and Altrincham, and textiles predominate in Stalybridge, Hyde, Stockport and Macclesfield.

## 2. Servicing.

In this category have been included all persons "industrially" engaged in providing services of all types—wholesale and retail trade, entertainment, health services, local power undertakings, local building and contracting, printing, bookbinding, photography, professions, personal and domestic services.

The servicing function, in 1921; was not well represented in



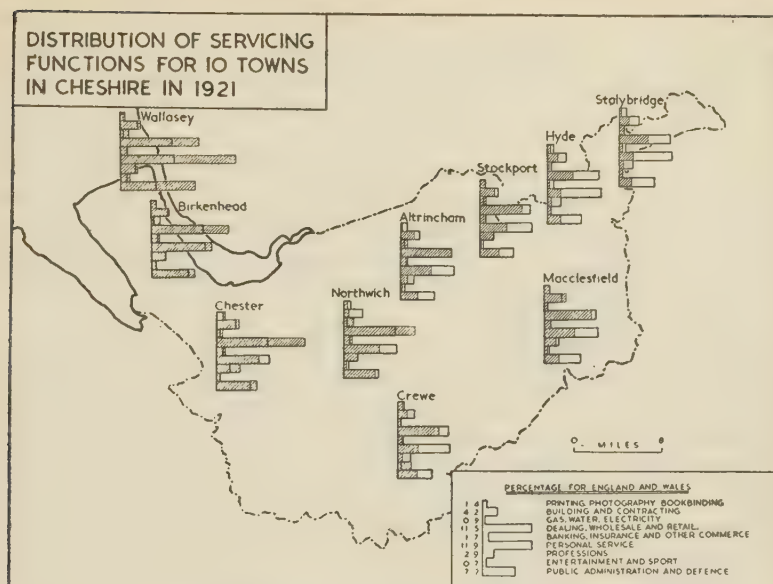


Fig. 5.

Lancashire except in certain of the coastal towns. Blackpool's servicing function was twice that of the average for England and Wales. Southport's was also high but only in two other towns, the big regional centres of Liverpool and Manchester, was the servicing function higher than average. The other sixteen towns all had services well below average, a striking indication of the fact that the majority of Lancashire towns were not engaged primarily in providing services for the countryside. Similarly, in Cheshire, the services of Chester, Wallasey and Northwich rose above average, but in the towns of the east services were well below average.

More detail of distribution of services in various towns in Cheshire is shown in Fig. 5. The map is eloquent in emphasising the concentration of retail and wholesale services in the towns of Chester, Wallasey and Northwich. Chester, for example, in 1921, had just over 20 per cent. of the total number of persons working in the city engaged in wholesale and retail dealing.

### 3. *Special Servicing.*

Persons engaged in finance, insurance and similar "industries" have been included in this category. A high proportion of special services was concentrated in Liverpool and Manchester, almost twice the average figure in each case—an indication of their regional influence and special character. The two towns most important for this function in Cheshire were Chester and Northwich but their figures were only just above average.

### 4. *Transport and Communications.*

Persons engaged in road, rail, canal and sea transport have been included in this category. The two great ports of Bootle and Liverpool

both had a very high proportion of their industrial workers in this category. Salford also had a high transport function because it catered for much of the shipping and rail transport into, and through, Manchester. No other town in Lancashire exceeded the average except Manchester. In Cheshire, the two centres, Chester and Northwich, the railway town of Crewe, and the port of Birkenhead all had transport functions greater than the average for England and Wales. But in the other Cheshire towns the function was relatively undeveloped, falling as low as 2·6 per cent. for Altrincham (compared with the average of 7 per cent. for England and Wales).

#### 5. *Administration and Defence.*

Data concerning administration were not separated from those for defence in the Census returns and both have, therefore, been considered under one heading. Only one town in Lancashire—Liverpool—was outstanding for this particular function. In Cheshire, Wallasey and Birkenhead were above average. Manchester, Preston, Salford, Southport, Blackpool, Chester, Northwich and Macclesfield had percentages just under average. Most of the remaining towns had administrative and defence functions very much below average.

#### 6. *Mining.*

An "incongruity" enters into the consideration of this function. Unfortunately, the number of persons engaged in mining and quarrying in each of the towns was omitted from Table 4 in 1921 because of certain difficulties in compiling information on the basis of "place of work." It has been necessary therefore to use data based in place of enumeration in this instance. In Lancashire, St. Helens, Wigan and Leigh were the only three towns in which this function was outstanding and it was poorly represented in all the Cheshire towns.

#### 7. *Agriculture.*

In this category were included all persons engaged in agriculture. In all the towns, of course, this function was poorly developed, but Wallasey, Southport and Blackpool, with their well-developed market gardens had higher agricultural functions than any of the other towns.

### CONCLUSION

Some of the difficulties inherent in the mapping of census data of occupations and industries have been considered. The variety of classifications from one Census to another vitiates any attempt at comparative studies. Regional detail is sufficient to enable maps to be constructed showing broad distributions, but details of accurate location are hard to establish because in the majority of census returns few data are available on place of work. This is a defect which will be remedied in future Censuses. "Pie symbols" and superimposed graphs offer certain possibilities for the study of functions and location of industry. The Census returns, with all their deficiencies, still offer plenty of scope for the exercise of cartographic techniques designed "to render evident to the eye, and to give a general notion of, the distribution of employment over the face of the country."

# OBITUARY

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## REGINALD THOMAS CORNISH

Reg Cornish was taken to hospital early in March, 1951, for what turned out to be an operation for peritonitis. He seemed to be making a good recovery after the operation, but was suddenly struck down by thrombosis and died on March 19th. He was 37.

Cornish had not come straight to the University from school, but had served four years with Lloyd's Bank, before entering King's College, London, in 1936. Three years later he took a B.Sc. degree with First Class Honours; he gave notable service to the College branch of the Geographical Association in his last year when he acted as President. By then the war was almost upon us, and he spent part of 1940-41 in the Royal Armoured Corps, but was soon transferred to serve as a meteorologist, first with a Bomber Group, and then with the U.S. 8th Army Air Corps. At the end of 1942 he was sent to Sweden for meteorological work, where, after hostilities had ceased, he worked for some time with the Swedish Meteorological Office. Upon his release in 1946 he took up an appointment at Birkbeck College, where he remained until coming to University College in 1948. During this time his academic interests resulted in some work on Swedish settlement, which gained him an M.Sc. in 1949. His main preoccupation, however, was with meteorology and climatology, and it is likely that, had he lived, his main contribution to geographical knowledge would have been in that field.

To those who were fortunate to work with Cornish, two strong impressions of him remain. Academically he was never more happy than when in the field. He enjoyed explaining the form of a piece of country and others enjoyed the explanation with him. On field excursions, he often took the opportunity also of "reading the sky" for his war-time experience had made him very skilful in field weather observation. There are many, undergraduates and others, who will always carry vivid and delightful memories of "Mr. Cornish's Field Classes." The other impression is a personal one. Cornish was a man of great integrity and great modesty. His consideration for other people arose not only out of an ingrained politeness, but out of a great fund of Christian charity. In the opinion of those most competent to judge, his early death has cost geography a most promising climatologist. Geographers themselves have lost a colleague with rare personal qualities, and wish to extend their deep sympathy to Mrs. Cornish and to his parents.

H. C. DARBY.

S. W. WOOLDRIDGE.



## CORRESPONDENCE

## THE FALL IN MANITOBA

Winnipeg, 2nd November, 1951. Temperature 5° F. 5 a.m.  
All leaves fell in two days. The Fall.

House centrally heated by a steam pipe from a factory half a mile away. This keeps the house temperature at 65° F. all through the winter. Ordinary clothes are worn indoors, but outdoors padded suits, fur coats and ear muffs are necessary. Handles of outside doors must not be grasped by the hand. Houses have double doors, back and front, and double windows to form an airlock, double windows on air-screen of a car. No fires are lit indoors for they would take the heat away.

In autumn cars are "winterised." Besides putting anti-freeze in the radiator the oil is changed in gear box, engine and steering column from a heavy type to a very light type which does not set solid even at a temperature of minus 40° F. There is a heating system from the hot water of the radiator to the car body. An electric heater installed in the engine is connected to a special plug in the garage wall or the car would never start up. Homes and cars have to be protected against the *worst* of winter conditions, 40° F., not the average (Jan. 3·5° F.).

N. V. S.

## HARRAP

## HUMAN GEOGRAPHY

PROFESSOR JEAN BRUNHES

*English Translation by*

E. F. Row, B.Sc. (Econ.), F.R.Econ.S.

This important work, available in English for the first time since before the war, now appears in an entirely new edition and has been re-translated from the French edition of 1946. The object of human geography is the study of the relations between human activity and the phenomena of physical geography. M. Brunhes does not pretend to give us the definite results of such research, but presents problems, indicates methods : in short, opens up systematically that vast, almost unexplored domain which gives promise of such significant discoveries. The text is profusely illustrated with maps and diagrams and a special section of photographs is included at the end of the book.

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# GEOGRAPHICAL ASSOCIATION

## ANNUAL REPORT

*January to August, 1951*

For the first time the Annual Report relates to a period that is not a full calendar year, since the change in date of our financial year necessitates a report for the period from January 1st to August 31st, 1951.

The work of the Association has progressed in some fields with considerable vigour, despite the present uncertainties, and we are glad to record a slight increase in our membership which on August 31st stood at 2,994 members of whom 576 were student members.

During times of such acute financial instability, when decisions regarding the framing of policies and action to be taken call for more than customary care and caution, it has been of the greatest value to have the kindly help and long experience of Mr. Brooks, our President, always at our service, and the Honorary Secretary is glad to record our thanks for the personal efforts he has made throughout the year on behalf of the Association and for his generous and immediate response to the numerous calls that have been made upon his time in dealing with our affairs.

Members will be happy to learn that the President's office is to be filled during 1952 by our distinguished friend, Professor Debenham. His acceptance of the invitation to hold this office will bring great pleasure to his numerous friends amongst students and teachers of geography literally 'the world over,' and we hope that there may be occasions during the year when he may be able to join us, despite his heavy programme of engagements.

The change in the date of the financial year now makes it possible for us to present an audited balance sheet at the Annual General Meeting. The effects of rising costs have caused not a little anxiety. As in 1950, so again in 1951 we have not paid our way. The executive committee has had this matter continually under review and all possible economies have been effected, but increased costs especially of printing, paper, stationery and postage, have seriously disturbed our budgets. With these difficulties in mind we urge members to do all in their power to maintain—and indeed increase—membership and to offer to pay their subscriptions under covenant. The latter scheme will materially improve our financial position without any additional cost to full members individually. It is with regret that we find that we may be unable to offer students restricted membership at the reduced rate of 6s. as the cost of four numbers of *Geography* now far exceeds this sum. The executive committee is not without hope that ways and means will be found whereby the need for increases in full membership subscription rates may be avoided; but for this to be possible we depend on the maintenance at least of existing membership.

The year has seen the organisation of three highly successful conferences, including the customary Annual Conference during January in London, followed by a Spring Conference in Hull, and a Conference during August in Sheffield. The latter, an international gathering (as recorded elsewhere) may lead to the inauguration of an international union of Geographical Associations, and those who attended the summer conference felt that in this pioneer venture our Association had reached new heights and a degree of international recognition and leadership that is a challenge to us all. In reviewing all of these major and outward signs of our work and functions, we extend especially warm thanks to our three Honorary Conference Organisers, Dr. W. G. V. Balchin (London), Mr. H. F. Brown (Spring Conference) and Mr. Tom Brown (Sheffield Conference), and to the many local members who assisted them.

Plans are actively under way in connection with three meetings to be held during 1952 that should prove to be outstanding events. The Spring Conference will be held at Tenby from April 18th to 22nd, under the expert guidance and direction of Professor Bowen; the second post-war Summer School will be held at Rhoose, South Wales, organised by Dr. Margaret Davies, from August 2nd to 16th; and at a date yet to be arranged earlier in the year, Professor Fleure will deliver a Herbertson Memorial Lecture, most probably in Sheffield.

The less obvious sides of the Association's activities have continued, with unabated vigour, through the year. Apart from routine business, the executive committee has been concerned with efforts to improve geographical standards in school geography broadcasts (in consultation with representatives of the B.B.C.);

in problems connected with the publication of wall maps, and of postgraduate research theses dealing with geographical teaching.

The *Public and Preparatory Schools Section Committee* reports that membership of the section is now open to women teachers and that a successful series of inter-school conferences has been initiated for its members.

The *Secondary Schools Section Committee* has devoted the year to an examination of atlases in use in schools and to preparing a statement regarding the sort of atlas felt to be needed. Some progress has been made towards the preparation of lists of juvenile fiction books which have a useful and accurate geographical background. The help in this work of members generally, would be much appreciated by the group secretary, Mr. Goodson, who asks that suggestions may be sent to him from individuals.

The *Primary Schools Section Committee* has prepared a revision of the handbook on *Geography in the Primary School*, and has continued to hold termly meetings in London. At these meetings the place of sample studies in primary school geography has been considered, special attention being directed to the readily accessible sources of the requisite factual and pictorial material needed for such work.

The *Training College Section Committee* has again held valuable and well-attended one-day conferences in London with emphasis also directed on the requirements of school atlases, and, in consultation with publishers, with reference especially to the requirements of the atlas for the Primary and Junior Secondary Modern School pupil. Some forty Training Colleges have taken part in the Section's research into children's reactions to geographical pictures. The results of this work are now being edited and it is hoped that a report will be issued in 1952.

The *Standing Committee for Visual Aids in the Teaching of Geography* has prepared a memorandum (shortly to be published) on the School Geography Room. Work is also progressing on the preparation of a booklet on film-strips (as a companion to an earlier booklet on Geographical Films). The routine review of film-strips for publication in *Geography* has continued.

The *Standing Committee for the Study of Urban Spheres* reports progress in pioneer surveys and mapping, especially with reference to towns in Dorsetshire, Wiltshire, the Isle of Wight, Hampshire, Sussex and Kent. Survey work has now been extended to cover towns in the remaining eastern and southern counties and the east Midlands.

We are increasingly indebted to the loyal and often arduous labours of our numerous branch officers who, year by year, by the maintenance of branch activities keep alive and expand local interest in our subject. This unrecorded work for the Association needs all the support that we can give, and the warmest praise is due to those who, often in the face of local apathy, continue to maintain and build up branch activities and traditions. We record with pleasure the re-forming of what promises to be a highly successful branch in Norfolk and the efforts that are being made to create new or revived branches in Glamorgan, Ireland, and Shropshire, and we urge any members who are interested in the possibility of forming a local branch to write to headquarters for further information and help. There are now forty-seven local branches in Great Britain.

The library and lantern slide collection is now in more active use; our strenuous librarian, Mr. Warrington, still makes the trans-Pennine journey to supervise its management; 582 loans were recorded between January and the end of August, and in the same period 100 accessions of books, pamphlets and other publications were added to the collection. The library now includes some 10,000 volumes and pamphlets.

It is encouraging to record that, during the past year, there have been three branch visits and three school group visits to Headquarters. From February until August, a large exhibition of textbooks, atlases and other geography material was displayed, both for the benefit of members and of the public.

Finally, we express thanks to the many friends who on Council and committees have helped forward the work of the Association in many ways, and at a time of peculiar difficulty. We would especially mention in this connection our three retiring members of Council, Dr. Briault, Miss Bennetton, and Mr. McIver, also Mr. Neville Scarfe, formerly Chairman of the Training College Section and of the Visual Aids Committee, and now Dean of the Faculty of Education in the University of Manitoba. To both Professor Scarfe and Mrs. Scarfe we send warm greetings and good wishes in their new ventures. We are happy, also, to record continued links with Manchester in expressing once again our appreciation of



the many efforts made on our behalf by Mr. Horrocks and Mr. Pye (as O.S. maps officer and Assistant Editor, respectively).

Alice Garnett, *Hon. Secretary.*

#### HERBERTSON MEMORIAL LECTURE

A Herbertson Memorial Lecture will be delivered on Monday, April 21st, 1952, during the Spring Conference by Professor H. J. Fleure, D.Sc., F.R.S. His paper will be entitled "The later developments in Herbertson's thought. A study in the application of Darwin's ideas." The Lecture will be given in the Little Theatre at Tenby, the Conference headquarters.

#### SPRING CONFERENCE AND SUMMER SCHOOL, 1952.

Members who wish to attend the Spring Conference at Tenby or the Summer School at Rhoose should make early application according to the instructions in the programmes included with this issue of *Geography*.

#### COVENANTING OF SUBSCRIPTIONS AND DONATIONS.

Members are urgently requested to support the scheme for the payment of subscriptions under covenant, as noted in the Annual Report. Forms for this purpose were circulated with the November issue of *Geography*. Duplicate forms may be obtained by applying to the Assistant Secretary at headquarters.

The Association will at all times be glad to receive donations large or small made under covenant for payment into the Accumulated Reserve Fund. Special forms may be obtained from headquarters for this purpose. A small gift can be approximately doubled in value to the Association by the reclamation of Income Tax, on donations paid under covenant. Such help will be gratefully acknowledged in *Geography*.

#### SECONDARY SCHOOLS HANDBOOK

A new handbook for teachers of geography, with special reference to Secondary Modern schools, has been prepared by members of the executive committee. This special publication will be ready for sale in February, price 2s., post free. Orders and remittances can be accepted now for posting immediately on its publication.

#### *Geographical Teacher*: A REQUEST.

A request has been received at Headquarters from the Librarian, King's College, University of Durham, for Volume 3, Part 3 (1905) of the *Geographical Teacher*, which is required to complete a set of the journal. Any member who can spare this copy, either as a gift or for sale, is asked to send it to Headquarters as early as possible.

#### REPRINTS AVAILABLE TO MEMBERS

A limited number of reprints of two articles by Prof. H. J. Fleure have been made available for sale to members. They are: "Geographical Thought in the Changing World," *Geogr. Review*, vol. XXXIV, 1944, price 1s. 3d., post free; and "The Geographical Distribution of the Major Religions," *Bull. de la Société Royale de Géographie d'Égypte*, Tome, XXIV, 1951, price 1s. 6d., post free.

#### CONGRATULATIONS

We extend our warm congratulations to Mr. A. C. O'Dell, head of the Department of Geography, on his appointment to the newly created chair of geography at Aberdeen University. Professor O'Dell has been untiring in his efforts to improve the status of geography in Aberdeen and this recognition by the Senatus of the University is very gratifying.

#### ANNUAL CONFERENCE OF GERMAN TEACHERS OF GEOGRAPHY

Notice has been received at headquarters from Professor Wagner, of the Annual Conference of German school teachers of Geography. A cordial invitation is extended to British members to attend this meeting, which will be held from April 15th-18th at Frankfurt-am-Main. The *Verbandes Deutscher Schulgeographen* hopes to welcome a few representatives of other countries as guests. The Hon. Secretary will be glad to receive names of any members who may be able to attend this conference. Further details of the programme can be supplied to those interested.

THE GEOGRAPHICAL ASSOCIATION

**ACCUMULATED FUND—INCOME AND EXPENDITURE ACCOUNT.**

**MISCELLANEOUS MAP AND PUBLICATION SALES.**

1950	£	s.	d.	£	s.	d.
<b>ACCUMULATED FUND</b>						
Balance at 31st December, 1950	117	15	5			
Debit: Deficiency as per Income and Expenditure Account for the eight months ended 31st August, 1951	26	16	2			
	20	39	0	8		
	—	11	14	9		
Add: Estimated value of Office and Library Furniture and Equipment	150	0	0			
Add: Proportion of Current Subscriptions (one-third)	474	16	3			
	375	624	16	3		
	738	636	11	0		
		243	8	7	393	2 5
					506	9 6
					899	11 11
					940	1 8
					181	13 8
					1,121	15 4
<b>LIFE MEMBERSHIP SUBSCRIPTION FUND</b>						
Balance at 31st December, 1950	2,012	2,029	3	3		
Add: Subscriptions received during the eight months ended 31st August, 1951	17	38	16	0		
	2,029	2,067	19	3		
Add: Value of 3% Defence Bonds re-transferred from Accumulated Fund	170	170	0	0		
	2,199	2,237	19	3		
					2,237	19 3
					£4,259	6 6
					£3,877	
<b>Forward</b>						
					£4,259	6 6
					£3,877	
<b>Forward</b>						
					£4,259	6 6
					£3,877	





## REVIEWS OF BOOKS

MEMBERS of the Library should know that, with very rare exceptions, books reviewed in this journal may be borrowed from the Association's library.

**Wales in Maps.** Margaret Davies. 19 × 25 cm. 111 pp. Cardiff : University of Wales Press Board. 1951. 7/6.

This atlas serves a dual purpose. It provides for grammar schools and training colleges a combined atlas and reader. Throughout the work a map, (or maps), on the left-hand page faces letterpress on the opposite page, and only rarely (as in the case of the growth of Cardiff) does a single topic spill over on to another page of maps and text. In addition, especially in the section on land forms, there are field-sketches and panoramas as well. The work falls into five major sections: physical geography, historical geography, agriculture and settlement, commerce and industry, and population, with 97 maps and diagrams grouped into 61 separate topics for study. Although some sections appear to be brief and ill-developed as, for example, the historical section which contains four maps only, one must not think that the work is in any way ill-balanced for a very large number of the topics selected under commerce and industry, and agriculture and settlement have a definite historical basis, and could quite as well have been included under the heading of historical geography. The study of village types and individual urban centres is highly commendable, especially the idea of placing the historical and the modern maps side by side for comparative study. What makes the work so outstandingly good is the high quality of the cartography throughout, and the clarity and simplicity of the maps and diagrams, balanced in each case by a well-written text dealing with both historical and geographical matter. The presentation is simple and direct and lies well within the grasp of the senior pupil or young student. There is no doubt that besides being the most comprehensive historical atlas of Wales, this volume is also the best all-round textbook of the geography of Wales now on the market. It should be secured by all schools and colleges within the Principality, and by all others interested in a well-balanced study of this important part of Highland Britain.

E.G.B.

**Ceylon : its Geography, its Resources and its People.** Elsie K. Cook. Revised by K. Kularatnam. 16 × 20·75 cm. xi + 360 pp. London : Macmillan & Co., Ltd. 1951. 10/6.

The late Miss Elsie Cook devoted a large part of her life to the furtherance of geographical studies in Ceylon and it is not too much to say that the present flourishing Department of Geography in the University of the Dominion springs directly from her efforts. She first went to Ceylon on a year's leave from teaching in England to advise on geographical work in Buddhist schools and training colleges. The visit changed the whole course of her life ; she returned to England determined to improve her basic knowledge by re-entering the University in middle age, then to make geographical work in Ceylon her life-work. On her first visit she realised the lack of a book on the geography of the country and so determined, with characteristic energy, to repair the omission. Intended originally as a textbook for teachers and scholars in secondary schools it grew in the process of writing and when published in 1931, under the title "A Geography of Ceylon," it included not only an able summary of the country's geography but much original work in village studies and regional descriptions. Well illustrated with photographs and many maps, all specially drawn, it took its place as a standard work. In this second edition, revised by Dr. Kularatnam, of the University of Ceylon, it is clear that the work has stood the test of time. A Sinhalese has found little to alter in what an Englishwoman wrote : statistics are brought up-to-date from 1927 to 1946 and chapters on the population and sections on human geography have been rewritten but the greater part is substantially unchanged.

With its sympathetic appreciation of Buddhism, its examples of method in geographical work, it is more than just a geography of Ceylon and should be in every school library whether or not the continent of Asia is a subject of special study.

L.D.S.

**Geography of the Pacific.** Otis W. Freeman. (Ed.)  $15\frac{1}{2} \times 23\frac{1}{2}$  cm. xii + 573 pp. London: Chapman & Hall, Ltd. (New York: John Wiley & Sons.) 1951. 80/-.

This work is a symposium, in which 13 American authors, under the editorship of Otis W. Freeman, combine to produce 19 chapters, running to 560 pages, in a survey of about one-third of the earth's surface. The Pacific in this context includes Australia and New Zealand, but excludes Japan as well as the mainlands of Asia and the Americas. It includes Indonesia, but excludes Malaya, and includes the Kurile and the Ryukyu Islands, but excludes Formosa. There are three general introductory chapters (Geographic Setting of the Pacific, The Native Peoples of the Pacific), leaving the greater part of the work for treatments of Australia, New Zealand and the numerous archipelagos. Much of this reflects the accumulation of knowledge by the American intelligence services during the late war, but even so the wide disparities in geographical understanding of the better known and the less known groups have not been entirely eliminated. In sum, this book is probably as good a job as can be made of this tremendous area at the moment, and if the adequacy of the available material and the calibre of the authors show some unevenness, that is a small price to pay for the convenience of having a wide range of material available in accessible form.

R.O.B.

**The Antarctic Problem.** E. W. Hunter Christie.  $16 \times 24$  cm. 336 pp. Allen & Unwin, Ltd. 1951. 25/-.

The Antarctic problem with which this book deals is the political dispute between Great Britain, Chile and Argentina over the islands, seas and part of the continent which now form the Falkland Islands Dependency of Great Britain. Fifteen chapters deal with the exploring expeditions or whaling activities in the area. These are exhaustively and admirably treated, and fully sustain the author's claim to "maintain a reasoned balance." The remainder of the book deals with the political problem proper. Geographers will be particularly interested in the geographical basis of the claims of Chile and Argentina. If it can seriously be maintained that because geologically these lands form part of South America they should belong to it politically, then widespread re-drawing of frontiers all over the world will be necessary.

A further interest in this political dispute is its relationship to others in the New World. Few would suppose that these claims of Chile and Argentina had any relationship to the claims of Venezuela in British Guiana, or Guatemala in British Honduras. Yet "the timing of the Chilean and Argentine penetration into the Antarctic, and the revival of the Guatemalan claim on British Honduras" was not accidental, and was closely related "to events at home and in Britain's eastern possessions." Such developments required firm and prompt action and one interesting commentary by the author—for which good evidence is produced—is that "those in charge of British policy after 1945" failed to take firm action and so "contributed to the present unhappy position."

This book is a very valuable study of an important problem of political geography. It is well illustrated, and is supplied with a good bibliography.

J.N.L.B.

**Fundamentals of Economic Geography.** Nels. A. Bengtson and W. Van Royen.  $18 \times 26.3$  cm. xxiii + 574 pp. London: Constable & Co., Ltd. 1950. 7/6.

This has been recognised as a valuable introduction to economic geography ever since its first publication in 1935, and most teachers will be familiar with one or other of the earlier editions. After a brief exposition of the field and function of economic geography, and a sketch of the distribution of world population, the essentials of physical geography (the internal forces and the external processes producing land forms), climate, broad climatic regions, vegetation and soils of the world receive treatment as background to production. Then follows a consideration of agricultural and forestry products and industries, mineral resources and their utilisation, manufacturing industries (including industrial regions), transport and commerce. The writing is clear and easy, the illustrations, including half-tones, are good, and the selected references at the foot of each chapter are particularly well-chosen and helpful. Statistics and



graphs based on them reach into the post-war years, in some cases to as late as 1948. In short, the book has at least maintained the standard of the earlier editions and will continue to receive a welcome from teachers, despite the fact (or even perhaps because of it) that inevitably the United States gets much more than proportionate emphasis. Advanced students will, however, find its main usefulness in the bibliography. R.O.B.

**An Introduction to Economic Geography.** N. J. G. Pounds. 14 × 22 cm. viii + 685 pp. London: John Murray, Ltd. 1951. 10/6.

This book is aimed at meeting the needs of the examination for the General Certificate of Education at the Advanced Level, and the explicit object of the author is "to explain rather than to describe the distribution of economic activities." It avoids the regional method, partly because regional treatments are already available, partly, one suspects, because the business of explaining is essentially an exercise in the systematics of economic geography. Given the limitations imposed by the stage of training to which the prospective readers have attained and by the amount of ground to be covered, one must account the author to have succeeded very well indeed. This is indeed a book of unusual arrangement and unusual content. Four chapters, for instance, are devoted to agriculture. Of these, one deals with the world pattern, one with "Problems and Policies in Agriculture" and one with "Agriculture in the 20th Century." Or again, there is a full chapter on "Population" and another on "The Industrialisation of Backward Areas." Dr. Pounds, in short, exemplifies the view that the central theme of economic geography is the interlocking of natural and economic conditions in man's utilisation of the surface of the earth, that this is a continuous and continuing process and that it must be studied historically. Other readers besides the reviewer will no doubt disagree with Dr. Pounds on this point or that. The fact remains that this book is well planned, well executed, and a welcome new departure in textbooks at this level. R.O.B.

**Economic Geography.** W. S. Thatcher. Teach Yourself Geography Series. xiv + 241 pp. 12.5 × 19 cm. London: English Universities Press. 1950. 6/-.

This little book makes a useful and unusual contribution to economic geography, though it is not the best introductory book on the subject. It presupposes some knowledge of both geography and economics, the approach being that of the newer school of economic-geographers who stress the economic aspect more than the geographical. It is, however, very definitely worth reading, for the ideas that it throws out are stimulating and challenging: as a book to discuss in tutorial classes it is excellent because of the controversial points it raises. From the introduction one might expect this to be a dry and rather pedantic little book, but this is far from the truth; it is written in a friendly style with a dry, crisp humour that helps to illuminate many dull points. The author occasionally wanders away from his arguments, which he himself admits, and consequently some sections become a little complex because of the numerous intrusive statements which have only distant relevance to the main theme. Chapter II, "Facts and Statistics" leaves the reader with slight mental indigestion.

The book is liberally sprinkled with suggestions for further reading and references to year-books, though some may be difficult for the general reader to obtain; as in the tedious list of references to obscure statistical volumes on page 44. Chapter IX, on the Mechanism of Exchange, is almost pure economics, and though it fits well into the general plan, it is heavy to read. The later chapters seem to improve, perhaps because the reader becomes used to the new method of approach, and the last three are particularly good. A few maps in the text would have saved words and clarified the written matter. At the end is a fairly full bibliography in which the books are graded by means of a number of stars according to their use to the beginner or more advanced student—an idea that could be well copied in other books of this type.

There is no doubt that, however severely one may criticise the book, Mr. Thatcher has made an interesting new approach to his subject. He is to be congratulated on having been so successful in presenting his material in what may almost be called a revolutionary manner. R.E.H.M.

# Geographical Articles in Magazines Received

CONTINUED FROM VOL. XXXVI, pp. 218-220.

Journals listed here may be borrowed from the Library by members of the Association. References are listed according to the classification published in the *Annals of the Association of American Geographers*, Vol. XXVII, June, 1937.

AG—Acta Geographica. AJ—Alpine Journal. A of G—Annals of the Association of American Geographers. AS—The Advancement of Science. BGB—Bulletin de la Société de Géographie de Beograd. CGR—Calcutta Geographical Review. EG—Economic Geography. F—Fennia. GA—Geografiska Annaler. GB—Geographical Bulletin, Ottawa. GG—Geografski Glasnik. GJ—Geographical Journal. GR—Geographical Review. GSI—Geographical Society of Ireland. GV—Geografski Vestnik. J of G—Journal of Geography. MPG—Michigan Papers in Geography. NG—New Zealand Geographer. NGT—Norsk Geografisk Tidschrift. PGA—Proceedings of the Geologists' Association. PGR—Pakistan Geographical Review. RBG—Revista Brasileira de Geografia. REC—Révue pour l'étude des Calamités. RGI—Rivista Geografica Italiana. SGM—Scottish Geographical Magazine. SR—Sociological Review. T—Terra. UE—United Empire.

(E)—English Summary. (F)—French Summary. (G)—German Summary. \*—Map.

**GENERAL GEOGRAPHY AND TRAVEL.** R. H. BROWN, A of G, Sept. '51.—Plea for Geography, 1813 Style. G. CHABOT, NGT, '50.—Conceptions françaises de la science géographique. A. CHOLLEY, GG, '49-'50.—Tendances nouvelles de la géographie française. (F). O. W. FREEMAN, J of G, May, '51.—Geography among the Sciences. O. J. R. HOWARTH, AS, Sept. '51.—Centenary of Section E (Geography), Brit. Assoc. G. P. INSH, SGM, Apr. '51.—Voyage of the Otter, 1795-97.

**MATHEMATICAL GEOGRAPHY AND CARTOGRAPHY.** T. ABRAMS, MPG, '44.—Photogrammetric Mapping and the War. G. BARBIERI, RGI, June, '51.—Nautical Chart of 1449 by Gabriel de Vallsecha. J. BARTHOLOMEW, SGM, Aug. '51.—Early Scottish Cartographers. F. V. BOTLEY, GJ, June '51.—New approach to World Distribution maps. F. V. BOTLEY, GR, Oct. '51.—New Use for the *Plate Carrée* Projection. E. FENTON, SGM, Aug. '51.—Vegetation and Agricultural Activities as shown by Aerial Photographs. G. KISS, MPG, '42.—Lipsky's Map and the First General Land Survey of Hungary (1786-1806). N. PYE and W. G. BEASLEY, GJ, June '51.—Undescribed manuscript copy of Inō Chūkei's Map of Japan. A. H. ROBINSON, A of G, Mar. '51.—Use of Deformational Data in Evaluating World Map Projections. R. R. ROGERS, MPG, '48.—Historical Cartography of the Great Lakes (1569-1746). J. A. RUSSELL, etc., MPG, '43.—Applications of Aerial Photographs to Geographic Inventory. F. A. STILGENBAUER, MPG, '46.—Improved (Polar) Lobate Globoid Grid for a Polar Map of the World: significance in Air Navigation. H. M. WALLIS, GJ, Sept. '51.—First English Globe: a recent discovery.

**PHYSICAL GEOGRAPHY.** N. M. BOWERS, etc., MPG, '41.—Lake-Shore Inventory and Classification (Michigan). C. A. COTTON, GJ, Sept. '51.—Accidents and Interruptions in the Cycle of Marine Erosion. O. ECKEL and H. REUTER, GA, '50.—Berechnung des Sommerlichen Wärmeumsatzes in Flussläufen. W. HEISKANEN, NGT, '50.—The Earth's dimensions (E). W. H. HOBBS, MPG, '46.—New Interpretation of Deposits of Pleistocene Continental Glaciers. W. H. HOBBS, MPG, '44.—Origin of the Gumbotils of the Upper Mississippi Valley. J. KERANEN, F, '50-'51.—Frost Formation in Soil. K. K. LANDES and J. T. WILSON, MPG, '43.—Ground-water Exploration by Earth Resistivity Methods. V. MARMO, T, '50.—Über Pflanzen als Indikatoren von Felsgrund in der Unterlage (G.). V. S. RADOVANOVIC, BGB, '47.—Formes et systèmes des vallées commençantes dans le terrain meuble. (F.) V. ROSSI, T, '51.—Simple radiometer for met. and biological investigations. (E.) J. P. ROTHE, REC, '50-'51.—Seismicité du globe pendant 1945-1946. M. SALMI, T, '50.—Origin and activity of volcanoes (E.) A. SIREN, F, '50-'51.—Computing Land Uplift from Lake Water Level Records in Finland. J. H. F. UMBGROVE, etc., AS, June '51.—Theory of Continental Drift. H. C. WILLETT, GA, '50.—General circulation at the last (Würm) glacial maximum.

**CLIMATE.** J. J. BURGOS and A. L. VIDAL, A of G, Sept. '51.—Climates of the Argentine Republic according to the new Thornthwaite Classification. (Trans. from Spanish). S. B. CHATTERJEE—CGR, June '50-'51.—General Methods in Climatology. W. GORCZYNSKI, BGB, '49.—Système décimal des climats. (F.) J. LEIGHLY, MPG, '41.—Effects of the Great Lakes on the Annual March of Air Temperature in their Vicinity. M. MILOSAVLJEVIC, BGB, '50.—Température minima à 2 mètres et à 5 centimètres au dessus du sol à Belgrade. (F.) H. OLSSON and W. SCHUEPP, GA, '50.—Atmosphärische Trübung in Spitzbergen. E. PALOSUO, T, '50.—Mapping of frost incidence. (E.)

**HUMAN GEOGRAPHY.** P. GEORGE, BGB, '47.—Géographie sociale et Géographie humaine. G. LOBSIGER, REC, '50-'51.—Colonisation et calamités naturelles. J. M. MAY, GR, Apr. '51.—Map of the World Distribution of Cholera.\* J. M. MAY, GR, Oct. '51.—Map of the World Distribution of Malaria Vectors.\* G. D. MITCHELL, SR, '51.—Relevance of Group Dynamics to Rural Planning Problems. I. RUBIC, GG, '49-'50.—Geographical Limitation surrounding a Town. (E.) O. TUOMINEN, T, '50.—Population size, a basis for urban classifications. (E.) O. TUOMINEN, T, '50.—Spheres of influence of centres of population. (E.)

**ECONOMIC GEOGRAPHY.** I. H. BURKILL, AS, Mar. '51.—Rise and Decline of the Greater Yam in the Service of Man. K. G. FENELON, AS, June '51.—World's Food Supply. S. B. JONES, EG, July '51.—Economic Geography of Atomic Energy. T. KAARTOTIE, T, '51.—Migration of Herring between Norway and Iceland. (E.) B. C. NETSCHERT, A of G, June '51.—Point Four and Mineral Raw Materials. G. E. PEARCY and L. M. ALEXANDER, EG, Oct. '51.—Pattern of Commercial Air Service Availability in the W. hemisphere. V. L. S. P. RAO, GGR, June '51.—Inventory of World Land Use. J. RUSSELL, AS, Mar. '51.—Rehabilitation of Devastated Areas. J. O. VEATCH and I. F. SCHNEIDER, MPG, '41.—Criteria for the Rating of Agricultural Land.

**TEACHING.** W. F. AMANN, J of G, Mar. '51.—Early Germany Geography Book. J. ASA, J of G, Apr. '51.—Maps and Slow-Learners. T. F. BARTON, J of G, '51.—Inexpensive Teaching Aids. R. H. BROWN, J of G, May '51.—Aspects of College Geography Pre-Tests. W. CALEF, J of G, '51.—Student Mapping of an Area of Multi-Story Buildings. J. W. CONOYER, J of G, May '51.—There's Geography in a Country Churchyard. R. E. CRAMER, J of G, '51.—Learning through International Correspondence. E. B. ESPENSHADE, J of G, Mar. '51.—Mathematical Scale Problems. B. FINE, J of G, Apr. '51.—Geography almost ignored in Colleges: Survey. A. HAAN, J of G, '51.—Oceanography in General Education. J. W. HAMILTON, J of G, '51.—Instrument and Method of Teaching Contour Lines. R. M. JUNGE, J of G, Apr. '51.—Basic Geographic Learnings at Secondary School Levels. F. KNIFFEN, J of G, Mar. '51.—Geography and the Past. C. LAWSON and E. CLARK, J of G, '51.—Specifications of Visual Materials in a fifth grade. J. D. McAULAY, J of G, May '51.—Whither Elementary School Geography. B. F. RICHASON, J of G, '51.—Geography in the Junior Colleges of the United States. J. M. SANDERS, J of G, Mar. '51.—Teaching conservation in the Elementary School. P. VOURAS, J of G, '51.—Geographer's Role in Educational Land Use.

**BRITISH ISLES.** M. W. BERESFORD, GJ, June '51.—Lost Villages of Medieval England. J. B. CAIRD, SGM, Aug. '51.—Isle of Harris. G. H. DURY, PGA, Sept. '51.—400-foot Bench in Warwickshire.\* A. FARRINGTON, GSI, '51.—Geomorphology of the Kinsale District. A. FARRINGTON and G. F. MITCHELL, PGA, June '51.—End-Moraine North of Flamborough Head. T. W. FREEMAN, GSI, '51.—Buncrana and its environs. C. FOX, AS, Sept. '51.—Study of Early Celtic Metalwork in Britain. W. K. V. GALE, AS, Mar. '51.—Birmingham and the Industrial Revolution. F. H. W. GREEN, GR, Oct. '51.—Bus Services in the British Isles. W. F. GRIMES, UE, May '51.—Roman London. W. A. HANCE, A of G, Mar. '51.—Crofting Settlements and Housing in Outer Hebrides. J. P. HAUGHTON, GSI, '51.—Kinsale. D. V. HENNING, GSI, '51.—Mitchelstown and its Demesne in 1841. B. L. C. JOHNSON, GJ, June '51.—Charcoal iron industry in the early 18th century. E. JONES, AS, June '51.—Some Aspects of the Study of Settlement in Britain. D. L. LINTON, AS, Mar. '51.—Midland Drainage. D. L. LINTON, SGM, Aug. '51.—Problems of Scottish Scenery. D. L. LINTON, SGM, Apr. '51.—Scottish River-Captures Re-Examined: II The Tarf. W. R. MEAD, T, '51.—English Cultural Landscape in the 18th Century. (E.) F. W. SHOTTON, AS, June '51.—Geological Approach to Midland Prehistory. M. SMIETON, UE,



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5. *Seven Lamps of Geography*. An appreciation of the teaching of Sir Halford J. Mackinder. E. W. Gilbert. Reprinted from *Geography*, vol. XXXVI, part I, 1951. Price 1/6, post free.
6. *The Geographical Distribution of the Major Religions*. H. J. Fleure. Reprinted from *Bull. de la Soc. Royale de Geog. d'Egypte*, T.XXIV, 1951. Price 1/6, post free.
7. *Geographical Thought in the Changing World*. H. J. Fleure. Reprinted from *The Geographical Review*, vol. XXXIV, 1944. 1/6 post free.
8. *Careers Memorandum*. 3d., post free.
9. *Class and Reference books in Geography for Form VI*. 8d., post free.
10. *Lantern Slide Catalogue Sheets with Notes* (53 sets). Price for the set, 9/-, including postage. Single Catalogue Sheets, 7d. Lists of Sets of Slides free if stamped addressed envelope is sent.
10. Current list of back numbers of *Geographical Teacher* and *Geography* available for purchase. 3d., post free.

Water and contour "pulls" of  $\frac{1}{4}$  in., 1 in. and  $2\frac{1}{2}$  in. maps can be ordered from the O.S. by the G.A. on request. For details, enquire from the Assistant Secretary. University Scholarships and Entrance Requirements : leaflet withdrawn for revision.